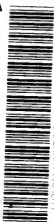


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How to make Good Pictures

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A Book for
the Amateur
Photographer

Published by
Eastman Kodak Company.
ROCHESTER, N.Y. the Kodak City.

TWELFTH EDITION 1922

How to Make
Good Pictures

*A Book for
the Amateur
Photographer*

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Eastman Kodak Company
Rochester, N. Y., *The Kodak City*

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PREFACE

“HOW TO MAKE GOOD PICTURES,” the title of this book, explains its mission.

We can only add that in it all photographic processes have been reduced to the simplest form consistent with good results—complex theories or untried experiments have not been introduced.

We have given prominence to the Kodak system of picture making because time has demonstrated its supremacy for the producing of good results in the simplest way.

EASTMAN KODAK COMPANY

ROCHESTER, N. Y.



Summer Time

The Choice of a Camera

THERE was a time when it was customary to open a book on photography for the amateur with a discussion of the relative merits of film and plate cameras. Such discussion is no longer necessary, for film quality has for many years equalled or bettered plate quality. As to the greater convenience of film there has never been any argument.

In addition to extreme lightness and compactness, combined with great durability, the film camera possesses the advantage of loading and unloading in full daylight; in fact, with the cartridge film camera and Velox paper, every process from loading the camera to the finishing of the print may be accomplished in ordinary light.

The sensitive film upon which the image is impressed by the action of light, put up in its convenient and compact daylight loading, cartridge form, weighs but one-twentieth as much as its equivalent in glass plates with the necessary holders, is non-breakable, and may be developed without the aid of a dark-room.

In speed and quality, Kodak Film is equal to the finest portrait plates; it is correct in orthochromatic balance, and has become the most dependable of photographic products.

With the perfection of the modern finder, the necessity for viewing the image on the ground glass screen is far more imaginary than real, and with the extremely accurate scales fitted to all focusing Kodaks the correct estimating of distance for sharp focus is a very simple matter.

However, with the two larger sizes of the folding Kodaks—($3\frac{1}{4} \times 4\frac{1}{4}$ and $3\frac{1}{4} \times 5\frac{1}{2}$)—the use of Kodak Cut Film or glass plates and the ground glass focusing screen is made possible by means of a simple combination back or adapter which takes the place of the regular back.

In the selection of any particular Kodak the safe rule is to buy the best the purse will allow, bearing in mind, nevertheless, that satisfactory pictures are made with even the least expensive of the Kodaks or Brownie cameras.

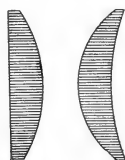
Practically all amateur work today is made with the small film camera. In many of the amateur photographic exhibitions large pictures will be seen, but in most cases the foundation of these pictures was a small film negative.

LENSES

It follows naturally, with the variations in size and cost of the camera, that the optical equipment will vary in the same proportion, and the user of any lens should familiarize himself with its limitations as well as its capabilities, always bearing in mind, however, that the lens equipment of any Kodak or Brownie camera will give perfect results within its limitations.

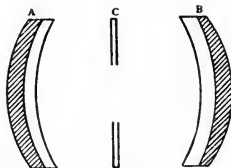
Lenses, commonly used in hand cameras, may be divided into three classes: "Single," composed of one piece of glass; "Single Combination" (sometimes also called simply "Single"), composed of crown and flint glass, and "Double Combination" (often called simply "Double"), consisting of two single combinations. The "Double Combination" is also known as "Rapid Rectilinear." Lenses of the highest correction and with greater covering and illuminating power are broadly classed as "anastigmats" and will be compared with the ordinary type later on.

Single Lenses Single Lenses are made in two forms, meniscus and plano-convex. The meniscus form, giving the best definition, is always employed except in the cheapest class of cameras. These lenses are always mounted behind the diaphragm which controls the amount of light to be admitted through the lens.



MENISCUS PLANO-CONVEX

Double Combination Lenses Double combination lenses are usually of the form shown in the illustration and consist of two meniscus lenses mounted with the diaphragm between.



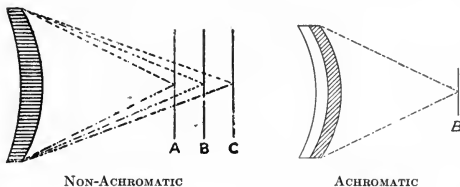
A, Front Combination. B, Back Combination. C, Stops.

DOUBLE LENS

Corrected Lenses All glass, when ground into lenses, has the quality of dispersing the different colored rays of light so that they will not focus on the same point.

The rays which act on the sensitive surface of the film and produce the image are those from the violet end of the spectrum and are called the actinic or chemical rays. The visual rays are from the red end of the spectrum, hence, if these rays are separated by the lens, the image we would see on the ground glass is not the one which would make the picture. Fortunately flint and crown glass have different dispersive powers, and, therefore, one can be made to correct the action of the other. Hence, if we assume that with a non-achromatic lens such as shown in the cut, the visual focus would be at C, the chemical focus would be at A. Flint glass bends the chemical rays more than

does crown glass, and so by combining a negative lens of flint glass with a positive lens of crown glass, the chemical and visual rays are brought into coincidence, i. e., are brought to focus in the same plane as at B. The lens is then called "achromatic." In a non-corrected lens even the chemical rays do not all focus at one point, but in small lenses the dispersion may be so slight as to be impossible of detection in the picture by the naked eye.

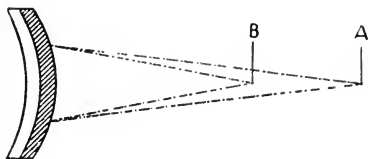


It may be said that the difficulties of lens making increase in geometrical ratio to the size of the film or plate to be covered, and many forms of lenses, other than those illustrated herewith, have been devised to overcome these difficulties.

In very small cameras an exceedingly simple lens can be employed; for instance, the lens used in the original Pocket Kodak, which took a picture $1\frac{1}{2}$ by 2 inches, was a single meniscus non-achromatic, and probably no lens ever had higher praise showered upon it, the reason being that it was carefully made, rigidly tested and inspected and not overtaxed. As a matter of fact no double achromatic lens could be made that would surpass it in brilliancy or covering power. For larger sizes, lenses must be corrected, but there is little in the double lens, except that of speed, unless $3\frac{1}{4}$ by $4\frac{1}{4}$ or larger pictures are desired. Single lenses tend to slightly curve the marginal lines of the picture, but this is unnoticeable in small pictures and is unobjectionable in view work of any size unless the picture contains architectural subjects.

Double lenses can be worked with a larger stop opening than single lenses and are, therefore, quicker, especially in the larger sizes. Such lenses are almost essential for $3\frac{1}{4}$ x $5\frac{1}{2}$ snapshot work and are preferable for $3\frac{1}{4}$ x $4\frac{1}{4}$, but below that the advantage, except that of speed, disappears. Everything depends on the quality of the work put into a lens. Differences of curve or polish, not to be detected except by an expert, often constitutes the difference between a good and poor lens and only those which have been through the most rigid inspection and trial should be put in a camera by the manufacturer.

Fixed Focus "Fixed Focus Lenses" are so often mentioned in catalogues and advertisements that the impression has gained ground that this is some distinct kind of lens, with an extraordinary power of focusing all objects near and far in one plane. There is no inherent quality in any lens that makes it "fixed focus;" it is such when it is immovable, and that is all. Any lens can, therefore, be made "fixed focus," but the extent to which it will focus all objects in one plane depends upon its length of focus and size of stop or diaphragm used, and upon that only. The reason for this is that the rays of light from near and far objects do not focus at the same point. For instance, in the exaggerated diagram shown below, we will assume that B is the point at which objects 100 feet



distant will focus and that A is where objects 10 feet distant will focus. Now the distance between A and B will vary in ratio to the focal length of the lens. In a lens of 3-inch focus it is ascertained mathematically to be $\frac{3}{16}$ of an inch and in one of 12-inch focus, $1\frac{1}{4}$ inches. Hence, if using a 3-inch focus lens the sensitive surface is placed between A and B, the object at 100 feet and beyond (all objects beyond 100 feet come practically within one focus) and objects 10 feet distant will none of them be more than $\frac{3}{32}$ out of focus, which with the size of stop ordinarily used for snapshot work, the blurring of the image is so slight that it cannot be detected. Experience has shown that the limit of focus for a lens which is to be employed for snapshot work with the focus fixed is under 5 inches; in other words, that a $3\frac{1}{4} \times 4\frac{1}{4}$ film is about the largest that can be used to advantage under such circumstances. It is possibly true that for cameras of this size and under, little can be gained by having the focus adjustable, and that, on the other hand, better average results will be obtained with a fixed focus, owing to the fact that there is no adjustment that will allow the lens to be put out of focus by a mistake in estimating distances.

Anastigmat Lenses

As stated earlier, aside from the simpler forms of lenses, there are those much more highly corrected, and calculated upon formulae that permit their working at a much larger aperture than the rapid rectilinear lens. Such lenses are termed anastigmats.

To secure a sharp, satisfactory negative with the ordinary R. R. Lens, its opening cannot be larger in diameter than one-eighth the focal length of the lens. Such opening admits sufficient light on clear,

bright days to obtain well-timed exposures even as fast as $\frac{1}{100}$ of a second; but in very dull lights snapshots are impossible.

But with an anastigmat the construction and optical corrections are such that sharp, satisfactory pictures may be made at an opening more than one-seventh the focal length of the lens—hence admitting over 60 per cent. more light in a given time than the R. R. Lens. In combination with a Focal Plane shutter exposures as short as $\frac{1}{1000}$ second may be made, and on dull days and even indoors, where, with an R. R. Lens little or no impression could be obtained, the anastigmat admits so much light that "slow snapshots" may be made.

GET ACQUAINTED WITH YOUR LENS

The user of any lens should familiarize himself with its limitations as well as with its capabilities. This is particularly true in the case of Anastigmats, and we therefore ask that those who are not entirely familiar with photographic optics read the following brief explanation, that they may get the full benefit of the power of their lens and that, on the other hand, they do not ask of it the impossible. It should be borne in mind, however, that what we have to say here is *applicable only to lenses of from 4 to 8¼ inch focus*, such as are supplied on hand cameras. These directions make no pretension to covering the entire field of photographic optics.

In comparing the work of one lens with another, you must first of all remember that such comparisons must be made with a stop opening of the same relative size (*f* value).^{*} In comparing the Anastigmat with the ordinary Rapid Rectilinear lens, do not expect as great depth of focus with your Anastigmat set at an opening of *f*.6.3 as your R. R. lens gives at its largest opening, *f*.8. The Anastigmat at *f*.8 will give as great depth of focus as will an R. R. of the same focal length with the same opening, while on the other hand, the R. R. will not work at all at *f*.6.3.

What Depth of Focus Means Suppose, now, that you are using your Anastigmat at the full opening *f*.6.3 and have set the focus at 15 feet. An object 15 feet distant will be absolutely sharp, but objects 10 and 20 feet distant will not be. Stop your Anastigmat down to *f*.8 or *f*.11 and those objects each side of the exact point of focus will increase in sharpness. Go further and use stop *f*.22 or a still smaller stop, and everything from about 10 feet on to infinity will be sharp. It will thus be seen that the smaller the stop, the greater the depth of focus, i. e., the greater the power of the lens to sharply define, at the same time, objects nearer the camera and further from the camera than the

^{*}It should be borne in mind that the shorter the length of focus, the greater the depth of focus. This explains why very small cameras can have a "fixed focus" (immovable), while larger cameras are all made so that they can be focused.

See Chapter on Diaphragms, page 18.

principal object in the picture, which, of course, is the object focused upon. But it is obvious that with the small stops the exposure must be correspondingly lengthened.

Anastigmat Speed Using a stop of $f.8$ or smaller the advantage of the Anastigmat over the really excellent Rapid Rectilinear lenses furnished with our cameras is not marked, but there is an improvement in definition and in the correctness of lines. But let us suppose that we desire to photograph a rapidly moving object, or to take a picture on a cloudy day. What do we find? The f value of a lens denotes the relation of the opening in the lens to its focal length. Suppose, then, that we have a single achromatic lens of 5-inch focus, speed $f.14$, a Rapid Rectilinear lens of 5-inch focus, speed $f.8$, and an Anastigmat lens, speed $f.6.3$, of the same length of focus, 5 inches. How do they compare in speed? To reduce this to its simplest terms we will divide the focal length (5 inches) in each case by the f value.

$$\begin{aligned} 5 \div 14 &= .357 \\ 5 \div 8 &= .625 \\ 5 \div 6.3 &= .793 \end{aligned}$$

It will thus be seen that in using the single lens the largest opening is $\frac{357}{1000}$ of an inch in diameter, with the R. R. lens $\frac{625}{1000}$ of an inch and with the Anastigmat $\frac{793}{1000}$ of an inch. The amount of light admitted by a lens in a given time depends, of course, upon the area of the opening at that time being used in that lens. The amount of light admitted in a given time with these different lenses would, therefore, be in direct proportion to the square of their diameters. Here, then, omitting the fractions, is the result:

$$\begin{aligned} \text{Single lens} & .357 \times .357 = .127 \\ \text{R. R. lens} & .625 \times .625 = .390 \\ \text{Anastigmat lens} & .793 \times .793 = .628 \end{aligned}$$

We thus find that the speed of the R. R. lens is over three times that of the single lens, and the speed of the Anastigmat is 61% greater than the speed of the R. R. lens. Therein lies the greatest Anastigmat advantage. But simply because it has this speed you do not always need to use it. The speed must be used with discretion, just as greater care is required in operating an automobile than in operating a bicycle.

Under conditions that would give you good results with an R. R. lens at $f.11$ use stop $f.11$ with your Anastigmat—do not use the largest opening for every occasion; use it only for emergency. *Your greatest Anastigmat advantage lies in the fact that when the light is so poor that you cannot get a properly timed negative with your R. R. lens at its greatest opening $f.8$ without resorting to a time exposure, you can open up your Anastigmat to its full opening and get a successful snapshot.*

For the same reason, i. e., because the Anastigmat admits more light in a given time than does the R. R. lens, it is used in connection with high speed shutters for photographing rapidly moving

objects. Even in bright sunlight the R. R. lens will not give sufficient illumination to make its use practical with the extremely high speed shutters when worked at their shortest exposures—but the Anastigmat, by reason of the large opening that can be used, enables you to take advantage of the high speed shutter.

Shutter Speed and Lens Speed Strange as it may seem, there are some amateurs who do not understand the difference between a fast lens and a fast shutter, thinking, apparently, that because they have a fast lens they should catch all moving objects sharply, or because they have a fast shutter that their pictures should be fully timed. The reverse of this is the truth. The fast shutter, by reason of shortening the exposure, cuts down the light and tends toward undertiming.* Remember that the speeds are always relative. Your Anastigmat opened to $f.6.3$ will not give as fully timed a negative in $\frac{1}{200}$ of a second as your R. R. lens will at $f.8$ in $\frac{1}{100}$ of a second. Your $f.6.3$ Anastigmat is 61% faster, not 100% faster than the R. R. lens.

Unfair Comparisons We have had some complaints that the Anastigmats were not giving as fully timed negatives as they should in comparison with the R. R. lens which our customer had previously used. *In every case* we have found that the fault was not in the Anastigmat, but in the old shutter with which the R. R. lens was used—such shutter having become dirty or through the springs weakening or other cause, failing to work at its supposed speed—the result under such circumstances being that the old lens was getting the benefit of a much longer exposure than was intended, while the faster shutter fitted to the Anastigmat was cutting off the light with greater accuracy.

Two "Stop" Systems The user of an Anastigmat should bear in mind that there are two systems under which shutters are marked for stop openings and this must be reckoned with in making comparisons. Most shutters for R. R. lenses are marked on the Uniform System (abbreviated to U. S.), while the shutters for Anastigmats are marked by the f system. The f value of a stop is the proportion that its opening bears to the focal length of the lens. For instance, $f.8$ means that the diameter of the stop opening is $\frac{1}{8}$ of the focal length of the lens, etc. The Uniform System is based on the *areas* of the openings, each next higher number having half the area of the preceding number and therefore requiring twice the exposure. For instance: If $\frac{1}{100}$ of a second be correct for stop U. S. 4, then with the same light conditions and stop U. S. 8, $\frac{1}{50}$ of a second would be required. However, the two systems are easily compared.

*This refers in particular to between the lens shutters. With a focal plane shutter, such as used in Graflex Cameras, other factors enter. Such shutters give more illumination of the film in a given time than between the lens shutters—but on the other hand, work many times faster when at full speed.

TABLE

U. S.	4	.	.	.	.	.	.	.	<i>f.</i>	8
U. S.	8	.	.	.	.	.	.	.	<i>f.</i>	11
U. S.	16	.	.	.	.	.	.	.	<i>f.</i>	16
U. S.	32	.	.	.	.	.	.	.	<i>f.</i>	22
U. S.	64	.	.	.	.	.	.	.	<i>f.</i>	32
U. S.	128	.	.	.	.	.	.	.	<i>f.</i>	45

There is no exact U. S. designation for *f.*6.3, it is approximately 2.5.

The larger the stop opening the less depth of focus. **A Law of Optics** This is not a rule covering any particular lens that we or anyone else exploits. It is a fixed law of optics, that with a large opening, depth of focus must be sacrificed. In the matter of opening, then, the difference between the R. R. and the Anastigmat is this: The Anastigmat will cut perfectly sharp on objects *at the focused distance*, over the entire picture with a large opening, admitting a large amount of light, thus requiring a relatively short exposure; but when this large opening is used, there is no great depth of focus. The R. R. lens will not cut the entire picture sharp with this large opening, even if correctly focused. With the smaller openings, as *f.*8, etc., the Anastigmat has the same depth of focus as the R. R. lens and gives sharper definition over the entire picture.

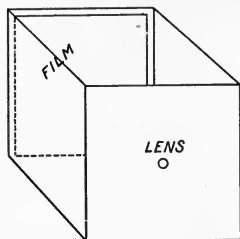
It is perfectly evident then that it is best to use only a moderately large stop opening (say *f.*8 or *f.*11) even with an Anastigmat, and time accordingly when conditions will permit. However, when the light is dull and a snapshot is desired, the full opening may be used; or if it is desired to photograph rapidly moving objects in good light, the full opening may be used with a high speed of the shutter. It must not be expected, however, that with such full opening objects in the foreground, in the middle distance and at long distance can *all* be sharp. Set the scale for the correct focus on the principal object and that object will be sharp. *As a rule, your picture will be rather better for having the unimportant parts less sharply defined than the principal subject.*

The Anastigmat will do everything better than the R. R. It will do some things that the R. R. cannot do at all—but no lens has yet been designed or is likely to be that can combine extreme speed with depth of focus, except in the very small sizes, or, in other words, except in lenses of very short focus. Even in these, the error is there, though not noticeable.

In making these comparisons we would be doing the subject scant justice did we omit to mention the anastigmat lens especially designed to meet Kodak requirements.

The Kodak Anastigmat Lens has all the quality and dependability which the word Kodak implies.

KNOW YOUR CAMERA



Before attempting the making of pictures it is of the utmost importance that you fully understand your camera and its equipment. A camera in its simplest form would be a simple box, made light-tight, with a lens at one end and a means for supporting a plate or film inside the box at the other end, as illustrated in the accompanying diagram.

The bellows, shutter and other attachments are simply convenient modifications of this form; the bellows permitting the folding of the light

chamber, and the shutter a means for allowing the light to pass through the lens for definite periods.

Before attempting to load the camera, examine it carefully and familiarize yourself with the shutter and its workings. Note carefully the diaphragm or stop openings in the shutter, and how with the larger opening a greater quantity of light passes through the lens in a given time, and you will then understand why we use the largest opening for snapshots, and the smaller ones for time exposures. The use of the diaphragms or stops is fully explained on page 18.

Having mastered the operation of the shutter, and the focusing device, if your camera is provided with one, and having some knowledge of the conditions necessary for picture taking, the camera may be loaded.

We will presume that you have taken the advice given in the previous pages and are in possession of a roll film camera.

LOADING THE CAMERA

With Roll Film With a Kodak this operation is performed in daylight and is very simple. The film is put up in light-tight rolls, and extending the full length of the strip of film and several inches beyond each end is a strip of duplex paper, red on one side and black on the other, which, in connection with the flanges on the spool, forms a light-proof cartridge.

The Autographic Film Cartridge is described on page 27.

After inserting the spool and threading up the paper the camera is closed and the key turned until the paper has been partly reeled off and the sensitive film brought into place in the focal plane. The duplex paper runs with and behind the film, and at proper intervals is marked with the number of the section of film, 1, 2, 3, etc. In the back of the camera is a small red window through which the figures appear as the key is turned. Press the key slightly and turn slowly to the left, watching the little red



FILM
CARTRIDGE

window at the back of the camera. When 15 to 18 turns have been given a hand pointing toward the first number will appear, then turn slowly until the figure 1 is in the center of the red window.

The warning hand appears only before No. 1. These figures show just how far to turn the key and how many exposures have been made. After all the exposures have been made, a few extra turns of the key entirely covers the film with duplex paper and the camera may be unloaded in daylight.



It is all as simple as threading a needle (simpler for a man), and with each camera a manual is supplied explaining each step. The amateur must bear constantly in mind, however, that the paper must be kept tightly rolled about the film all the time until it is in place in the camera and the camera closed, for should the film be exposed to daylight for even a hundredth part of a second it would be ruined.

In the regular amateur sizes Autographic Film Cartridges of the $1\frac{5}{8} \times 2\frac{1}{2}$ (Vest Pocket) size are obtainable in eight exposure rolls; the $2\frac{1}{4} \times 3\frac{1}{4}$ in six exposure rolls; $2\frac{1}{2} \times 4\frac{1}{4}$ and $3\frac{1}{4} \times 4\frac{1}{4}$ in six and twelve exposure rolls and the $2\frac{7}{8} \times 4\frac{7}{8}$ and $3\frac{1}{4} \times 5\frac{1}{2}$ in six and ten exposure rolls. For the $3\frac{1}{2} \times 3\frac{1}{2}$ and 4×5 cameras film is obtainable in six and twelve exposure rolls.

Kodak Cut Film and Combination Back Kodak Cut Film has all the advantages of glass plates and in addition is non-halation, weighs but a fraction as much, is easier to handle, unbreakable, and produces negatives of superior quality. By means of the Combination Back, Kodak Double Plate Holder and the Kodak Cut Film Sheath, the Nos. 3 and 3A Kodaks, both regular and *Special* models, can be adapted to use Kodak Cut Film. It is supplied in two speeds—Kodak Cut Film regular emulsion equal in speed to the best portrait plates and standard in every respect; Kodak Cut Film *Super-Speed*, an extra fast emulsion which can be depended upon to give the best negatives under difficult light conditions, or when an exposure must be necessarily short.

Loading Cut Film and Plates For loading with Kodak Cut Film or glass plates a dark-room is necessary, that is, a room from which all white light is excluded. A safe dark-room lamp and a table or shelf should be provided. After making sure that no white light is entering the room remove the dark slides from the plate holders and have ready the empty cut film sheaths. If loading with Kodak Cut Film take a film from the box and slide it into the grooves on the two sides of the sheath, emulsion side face up. Two V notches will be felt in one edge of the film. When the film is held with these notches on the upper edge and at the right hand corner the emulsion or sensitive side is face up. The sheath is now put into the plate holder, face out, and the dark slide inserted with the rough side of the handle facing the film. If the plate holder is a double holder repeat the operation for the other side.

To load with glass plates the operation is much the same. Handle the plate by its edges and put it in the holder face up—the face is the dull side, replace the dark slide and fill other side.

Any films or plates left in the box should be carefully covered before the white light is turned on. It is important that the black sheets that separate the Kodak Cut Films in packing should be kept dry and clean and replaced between the films after exposure and before development if this is not carried out immediately when the holders are unloaded.

The Film Pack

By use of the Kodak Film Pack the ordinary plate camera is transformed into a daylight loading film camera with the advantage of focusing on the ground glass the same as when using plates. This pack consists of twelve flat cut films packed together in a light-proof paper case. Attached to each film is a paper tab, the end of which is numbered, thus showing just which film is in position for exposure. The method of using this pack is extremely simple, as the only movement necessary in placing a film in position for the next exposure is simply to pull out a tab.

MAKING THE EXPOSURES

Before attempting the actual making of exposures it is essential that the beginner have some practical knowledge of the sensitive film, its composition and the action of light upon it.

The only difference between a dry plate and a film is in the support, that of the plate being a sheet of glass, and of the film a flexible transparent material that is light, non-breakable and rollable, the sensitive coating or emulsion in each instance being the same. In addition to the advantages of a light, flexible and non-breakable support, film possesses several other distinct and important advantages:

Kodak Roll Film is protected by being backed with a strip of specially prepared paper, red on one side and black on the other, the red side coming in contact with the sensitive surface of the film. This backing in combination with the thinness of the film support renders the film almost entirely free from halation, a defect found very largely in all glass plates unless specially prepared. Halation and its causes are explained in the Glossary. This freedom from halation gives the film a far greater latitude in exposure than can be given with plates, and especially adapts it to the conditions of harsh lightings under which the amateur ordinarily works.

In addition to these most advantageous features, Kodak Film is superior in *Orthochromatic Quality*. As this is a most important qualification a rather full explanation is desirable.

In the earlier days of photography the plates used gave very untruthful renderings of *color values*. Yellow and red, for instance, photographed as black, while violet, indigo and blue, photographed as white. The chart on page 17 shows the range of the spectrum from violet to red.

The ordinary plate is highly sensitive to violet, a trifle less sensitive to indigo, and so on; as we approach the other end of the spectrum, the yellow and orange rays affect the plate but little and the red rays hardly at all.

An orthochromatic plate or film is one in which these errors have been so far corrected as to give truer color value, i. e., the emulsion is sensitive to a wide range of colors in an equal or nearly equal degree.

Why Orthochromatism Helps

the blue ones, though to the eye, the yellow flowers had appeared lighter.

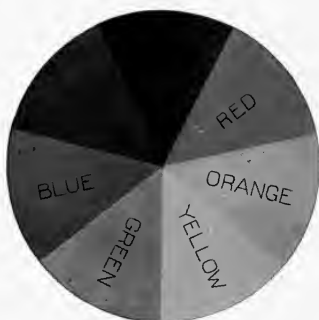
With a non-orthochromatic plate you might be making a picture, with say a bed of flowers in the foreground—some light yellow and others dark blue. The negative, owing to its deficiencies, would yield a print in which the yellow flowers would appear darker than

In other words, it would not give, in the resulting picture, the true color values. The fully orthochromatic film or plate corrects the mistakes and renders the color *values* (the intensities of color) in their proper relation to each other.

In the same way the orthochromatic film helps to preserve cloud effects, differentiating between clouds and the surrounding blue sky.

In a properly equipped factory, such as ours, there is no difficulty whatever in making any desirable degree of orthochromatism. Naturally, however, intelligent use must be made of this ability. For instance, we manufacture a plate (Panchromatic) that is so sensi-

tive to red that not even the most perfect ruby lamp can be used with it, and it has to be handled in an extremely feeble green light. It is therefore, self-evident that such a film or plate would not be practical for ordinary use.



Kodak film was first made as an orthochromatic film in 1903. Up to that time we had sold hundreds of thousands of orange dark-room lamps with our developing outfits. Immediately it became necessary to substitute a deep red for orange because this orthochromatic film was so sensitive to yellow.

Kodak Film has behind it, not only perfect manufacturing facilities, but every advantage that experience and scientific research can offer, and possesses orthochromatic quality in absolutely the right degree to give the best possible average results in the hands of the amateur.

Kodak Film is the most perfectly balanced film in the rendering of color values.

Everything else being equal film will, therefore, give better results for the amateur than can be secured on glass plates.

A negative is produced by the action of the rays of light passing through the lens, and coming to a focus on the sensitive surface of the film which is composed of an emulsion of silver salts. Light colored objects reflect strong rays of light and they affect the sensitive surface the most. With a clear, bright sky, the rays from it will render the sky in the negative opaque, or nearly so; the rays reflected from a white object will be almost as strong as those from the sky; the rays from a red brick chimney will affect the sensitive surface much less, while so little light comes from heavily shaded places as to hardly produce an impression. Therefore, we have in the negative, a record of the lights and shadows as we see them, but all reversed. When these are again reversed in making a print from the negative, we have them again in their proper relation. A certain amount of light is necessary in order to produce a negative of proper density. We can make a snapshot out-of-doors on a bright day in $\frac{1}{50}$ of a second or even

less. If we wish to take a picture indoors on the same day, we must expose from two seconds to several minutes, according to the amount of light entering through the windows, and the coloring of the wall and floor coverings. You cannot make a snapshot indoors, neither can you give a long time exposure outdoors on a bright day, with successful results—your exposure must be approximately correct. Fortunately, Kodak Film has most remarkable latitude and one can vary quite a percentage either way from the absolutely normal exposure and still produce good results.

In the chapter devoted to home portraiture, a number of comparative experiments are given. See page 57.

STOPS—OR DIAPHRAGM OPENINGS

An understanding of the use of the lens diaphragms or stops is absolutely essential to good work. The best part of a lens is its center, i. e., those rays of light which pass through a lens at or near its center will be correctly refracted and will, therefore, give an image sharp and clear on the ground glass, while the rays which pass through the outer edges of the lens will not make such a clear and distinct image. It can thus be seen that the smaller the stop opening the sharper the picture, because the outside rays of light will be cut off. It naturally follows that with the smaller opening we employ the less light we are admitting in a given time.

As an instructive experiment, if the beginner has a camera with a focusing screen, let him focus some object on this screen, using the largest stop opening, and noting the lines comprising the image to see if they are sharp. Then let him use the smaller opening and note the increase in sharpness, and the decrease in light. The better the lens, the larger the stop opening we can use successfully, and consequently the "faster" the lens. Suppose we have one lens of eight-inch focus, and we find that in a given light we can make a clear, sharp picture in five seconds with a stop one inch in diameter, while with another lens of the same focal length we must use a stop of but one-half inch in diameter in order to get a sharp picture. Unless you stop to think your answer will be 10 seconds for the lens with the half-inch opening. As a matter of fact we must give four times the exposure, or 20 seconds, because the *area* of the one-inch stop is four times that of the half-inch stop. Now, if we know the correct exposure with any one stop we can figure the correct exposure with any other stop by the following rule:

The time variation between two stops is inversely as the square of their diameters. With most of our single lens cameras (box type) there are stop openings of three sizes: the largest for ordinary snapshots, the second (which has almost $\frac{2}{3}$ the diameter of the largest) for snapshots on the water or for time exposures, the third for time exposures—never for snapshots.

With the Rapid Rectilinear lenses there is a greater number of stop openings and they are arranged by what is known as the Uniform System, commonly abbreviated to "U. S." See page 19.

The convenience of the U. S. System lies in that each higher number stands for an opening having half the *area* of the preceding opening. For instance, the table given on page 54 is for use with stop 16 with the No. 3A Autographic Kodak. If we use stop U. S. 8 give one-half the time; with U. S. 32 we must give twice, or if U. S. 64 is used, give four times the time of the table.

The shutters used with Anastigmat equipment are usually marked with the *f.* system. See page 12.

Ordinarily the appended table is a good one to follow in the use of the stops with a Rapid Rectilinear or Kodak Anastigmat *f.7.7* lens, but there are some exceptions:

Note: U. S. 4 equals *f.8*, but the speeds of *f.8* and *f.7.7* are so nearly identical that the same exposure can be given in either case.

U. S. 4, *f.8*, *f.7.7*—for instantaneous exposures in *slightly* cloudy weather, using speed 25. Do not attempt instantaneous exposures on dark, cloudy days.

U. S. 8, *f.11*—for *all ordinary instantaneous exposures* when the subject is in the bright sunshine, using speed 25.

U. S. 16, *f.16*—for instantaneous exposures when the sunlight on the subject is unusually strong and there are no heavy shadows; such as views on the seashore or on the water, using speed 50; for ordinary *landscapes* in bright sunshine with clear sky overhead; also for interior time exposures.

U. S. 32, *f.22*—for instantaneous exposures of extremely distant views, marine or snow scenes, or clouds in bright sunshine, at speed 25; also for time exposures.

U. S. 64 and 128, *f.32*, *f.45*—for time exposures outdoors in cloudy weather—see table on page 54. *Never for instantaneous exposures.*

To get the greatest "depth of focus," i. e., have all objects both near and far, needle-sharp, use the smallest stop.

U. S. 4 or *f.7.7* stop is not to be used when absolute sharpness is desired, as the opening is so large that few lenses will have a good "depth of focus" with it—i. e., only the objects at the exact distance focused will be sharp, those nearer to or farther away being more or less "out of focus."

Sharpness is extremely desirable in a picture, but what we call "roundness" and "atmosphere" is perhaps fully as important. What is meant by these rather vague terms is sometimes puzzling to the beginner and they are, perhaps, best explained as referring to that quality in a picture which gives the proper idea of both distance and perspective—that quality which is the opposite of the silhouette; which makes every object appear in proper relation to every other object and gives life and character to the picture. "Atmosphere" and "roundness" we find by practical experience are somewhat lost by using too small a stop. We should, therefore, use the largest opening which will give us a sharp picture.

SHUTTERS

The box form cameras of our manufacture are equipped with the Eastman Rotary Shutter. This shutter does not include an iris diaphragm, the stop openings being on a sliding plate and brought into position by means of a lever. The shutters on the folding film cameras are equipped with iris diaphragms, the size of the stop opening being regulated by the opening and closing of the device.

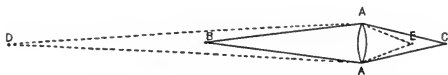
Graflex Cameras are equipped with what is termed a focal plane shutter. This type of shutter is radically different from both the rotary and the iris diaphragm shutters in that it is placed at the back of the camera, immediately in front of the sensitive film, instead of just in front or between the lenses. With cameras so equipped the stop openings are naturally in the lens barrel and entirely independent of the shutter.

The manuals accompanying the different cameras cover these points fully.

FOCUSING

If your Kodak makes pictures $3\frac{1}{4} \times 4\frac{1}{4}$ inches or larger, you must look to your focusing as well as to the matter of light and stops. The manual accompanying the camera explains how to do this, but something of the reasons for the necessity of it may be of value to you. It is our intention to make this book intensely practical, yet a little theory often helps one to the accomplishment of practical ends.

Suppose we wish to make a picture of an object six feet away; the focusing point would be (with most lenses used in a $3\frac{1}{4} \times 5\frac{1}{2}$ camera) $7\frac{1}{2}$ inches from the lens. Now again, should we wish to make a picture of an object 100 feet or more distant, we find that the focusing point will be $6\frac{3}{4}$ inches from the lens. So you can readily see that, with a camera of that size, it would be impossible to have a lens always set at the same point or distance from the sensitive surface, for if the nearby objects were in focus (sharp), the distant ones would be out of focus (not sharp), and *vice versa*, and for that reason we have what is called an "adjustable focus;" that is the front of the camera or that part which carries the lens, is made so that it can be moved and the distance of the lens from the sensitive film or plate be increased or decreased.



AA Lens. C focus of the rays of light from object B.
E focus of the rays from object D.

The variations of focus is shown greatly exaggerated in the above diagram.

When we say that a camera is "in focus" it is equivalent to saying that the sensitive surface of the film or plate, when in the camera, will come in contact with the rays of light reflected from the subject at this point or the point of focus.

To Focus On the Adjustable Focus Kodaks will be found a little scale marked with figures, usually from six to one hundred, and indicating feet. (They are also marked for meters.) You will also find a little pointer that, as you move the lens back and forth, will pass over the scale. Now should you wish to take a picture of an object, say fifteen feet distant, you will move the pointer until it rests over the figure 15. This indicates that the lens has been brought to the proper distance from the focal plane (i. e., the surface of film or plate) for the focusing of objects at a distance of fifteen feet. Objects nearer by, or farther away, will not be absolutely sharp, this, however, depending largely upon the size of the stop you are using. See page 18.

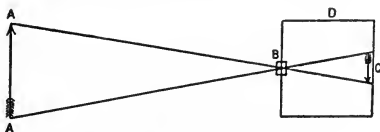
While the adjustable scale for all cameras up to and including $4\frac{1}{4} \times 6\frac{1}{2}$ in., will, when carefully used, give just as sharp pictures as can be obtained by focusing on the ground glass, there is some satisfaction to the student of photography in focusing the object on the glass before he sets out on his photographic career. It shows him what his lens is doing and why it impresses an image on the sensitive film.

When used with cut films or plates, the No. 3, and 3A Kodaks may be focused on the ground glass, there being a special Combination Back and Focusing Glass for the purpose, the No. 4 Folding Pocket Kodak takes a glass plate and cut film adapter with focusing ground glass. However, for the purposes of the study of this question of focus this back is not necessary, as the back of the camera may simply be removed and a piece of ground glass laid against the rollers over which the film passes and the picture may be focused on this. Be careful, however, to have the glass of such size that it may be placed in actual contact with the rollers; otherwise, it will not be in the proper focal plane and the lesson will be lost.

The experiment of looking at the image on the ground glass may be similarly tried with the fixed focus Kodaks and will prove extremely interesting and instructive to the beginner. To accomplish this, place the camera on a tripod, on the window sill or on a table. It will be better to focus on something outside of the house at first, as the light will be stronger. Point the camera at some object, a tree, for instance; put the ground glass in position, use the largest stop and open the shutter. With your head about one foot away and your eyes on a level with the camera, take a piece of black or dark cloth and place over your head and back part of the camera, thus cutting off all light except that entering through the lens. Do not try to look through the ground glass, but at it. In a few seconds, or when your eyes get accustomed to the darkness, you will see a picture on its surface. The picture or image you see will be just what you would get on the sensitive surface of your film or plate. You will, however, notice that the picture is inverted or upside down. This may excite your curiosity but will explain itself by the aid of the following diagram:

The rays of light from "A" passing in a straight line through "B" until they are interrupted by "C," on which they strike, form an inverted image of the object "A."

Now move the lens back and forth until the tree is sharply defined on the ground glass. When the lens is at just the proper distance



Let A represent a tree.
 B the lens.
 C the ground glass or focusing screen.
 D the camera.

from the ground glass, the object will be as "sharp as a needle" even if the largest stop be used. Now focus on objects at other distances. First, on an object one hundred feet or more away and then on an object only eight feet away. You will notice that the further away the object, the nearer to the focal plane (ground glass) the lens must be in order to give a sharp picture, and *vice versa*. And you will notice further, if you take the trouble to carefully measure the distances, that your ground glass tells the same tale as your focusing scale—in other words, if you focus on an object 25 feet distant and get it sharp, that the pointer on the focusing scale will point at, or nearly at, 25. You will also notice that all objects from about 15 to 35 feet will be in good focus.

Our factory methods of adjusting the focusing scale correspond closely to the foregoing paragraph. To insure accuracy, the focusing scales are placed on Kodaks by actual focusing. The camera is placed beneath a hood, which serves as a focusing cloth and cuts off all light except that entering through the lens. Incandescent lights are arranged at different distances, which correspond to the figures on the focusing scale. For instance, the camera is first focused on a light 15 feet away, regardless of the scale, which is then so placed on the camera that the 15-foot mark will come directly underneath the pointer. The scale is then fastened in position and tested at other distances, the images on the ground glass being examined with a magnifying glass. Before the camera is finally passed from this department, an inspector makes certain that the focusing scale corresponds exactly with the ground glass at each distance.

While the shutter is open and the ground glass is in position it will prove interesting and instructive to note also the effect of the stops. After focusing on some object with the largest diaphragm, reduce the aperture and note the decrease in light and the increase in sharpness over the entire picture. There may be no marked increase in sharpness of the particular object on which you have focused, but nearer and further objects will be sharpened in a remarkable degree.

Remember this point later. The above experiment with stops may also be tried with the fixed focus cameras.

Having now something of the theory of photography, you are prepared to make your first negatives. Read carefully the instructions on the making of snapshots and time exposures given in the following pages; having also read carefully the instructions for operating your camera, which are given in the manual accompanying it, you are ready to go out and make some negatives. We advise snapshot work to begin with, but you should be sure to pick out for your first work a day when the light is strong and brilliant, that your first batch of negatives may be fully timed.

SNAPSHOTS

Instantaneous exposures or "snapshots," as they are more frequently called, are usually made while the camera is held in the hand and are about the first thing that the amateur attempts. Some learned writers deprecate this, but as snapshots are the simplest exposures to make and ordinarily the simplest to develop, because most likely to be correctly timed, we believe the amateur should begin his photographic career with this class of work.

Before making an exposure, either time or instantaneous, be sure of four things:

First—That the shutter is adjusted properly. (For time or instantaneous exposures as desired.)

Second—That the diaphragm lever is placed at the proper opening.

Third—That an unexposed section of film is in position, or that an unexposed plate is in position and that the dark slide has been removed.

Fourth—Unless the camera has a fixed focus see that it is properly focused on the *principal object* to be photographed.

When making instantaneous pictures the object must be in the broad, open sunlight, but the camera should not be. The sun should be behind the back or over the shoulder of the operator.*

Set the Focus Set the focus by placing the pointer over the figures *in feet*, on the focusing scale nearest the estimated distance of the *principal object* to be photographed.

It is not necessary to estimate the distance with any more than approximate accuracy. For instance, if the focus is set at 25 feet (the usual distance for ordinary street work), the sharpest part of the picture will be the objects at that distance from the camera, but everything from about 15 to 35 feet will be in good focus. For general street work the focus may be kept at 25 feet, but where the *principal object* is nearer or farther away the focus should be moved accordingly.

*NOTE—Effective pictures may frequently be made by working toward the sun, shading the lens to keep out direct sunlight when so doing, but the amateur should not attempt such work at the start.

When using the No. 1A or the 3A Autographic Kodak *Special*, the Kodak Range Finder should be used according to instructions that accompany these Kodaks.

Use the Proper Stop It is imperative that a large stop be used in making snapshots. With most cameras the *largest* stop must be used under ordinary conditions with bright sunlight. This is the case with all of the single lens Kodaks. With the double lens Kodaks use U. S. 8 or *f.11*. See page 18.

This size stop *must* be used for snapshots except where the sunlight is *unusually* strong and there are no heavy shadows, such as views on the water, or extremely distant views or landscapes with clear sky overhead, when the smaller stop may be used.

The smallest stop must never be used for snapshots or absolute failure will result.

Locate the Image Hold the camera steady and locate the image in the finder. This gives the exact scope of view and shows on a reduced scale just what will be in the picture—no more, no less.

MAKING INSTANTANEOUS EXPOSURES

Hold the camera firmly against the body, as shown in illustrations, and when operating the cable release or pressing the exposure lever, hold the breath for the instant. The least jar will cause a blurred negative.

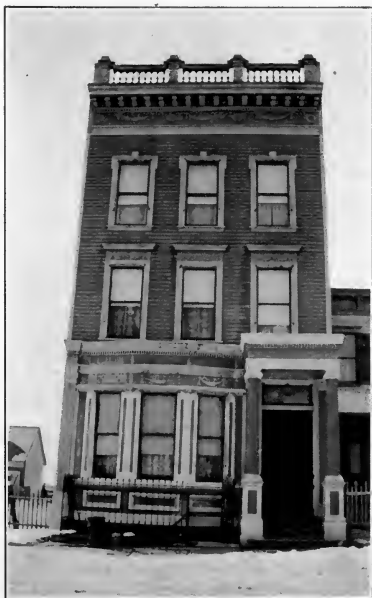


The camera must be held level.

**Hold the
Camera
Level**

If the operator attempts to photograph a tall building, while standing near it, by pointing upward (thinking thereby to center it), the result will be similar to the illustration below. When making this picture the camera was pointed too high. The building should have been taken from a building opposite and at a level corresponding with the middle of the subject.

The operator should hold the camera *level*, after withdrawing to a proper distance, as indicated by the image shown in the finder. Some cameras are equipped with a rising and sliding front to assist in taking the tops of tall buildings. See page 26.



Effect produced by tilting camera.

THE RISING AND SLIDING FRONT

Occasionally in the taking of photographs of buildings or in landscape photography it is found that the subject cannot all be readily included except by tilting the camera, which would produce the undesirable results shown on page 25. To assist in correcting this fault some cameras are provided with a rising front, which may be utilized in cutting out an undesirable foreground or to assist in taking the top of a high building, etc. To illustrate this we take the No. 3A Folding Pocket Kodak, which is manipulated as follows:

Fig. 1 shows how to raise or lower the front when making vertical exposures. Press the smaller milled head on the right-hand side of the front, and raise or lower the front by turning the larger milled head. When the front is at the desired height let the milled head spring back into its original position. This will lock the front in place. When through using press the milled head and center the lens by moving the front up or down, as the case may be. When the center position is reached the milled head locks automatically.

The front can be moved to the right or left (up and down when Kodak is placed on its side

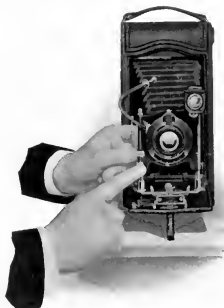


FIG. 1.



FIG. 2.

for horizontal exposure) by loosening thumb screw directly under the shutter and pressing release catch as shown in Fig. II, and sliding front in either direction to the desired position. Lock in position by tightening thumb screw. When through using, reverse the operation shown in Fig. II, and slide back to the center and lock in position.

In order to make a sharp picture when using the rising front it will be better to use a small stop, and as this in turn necessitates a time exposure, a tripod or other firm support must be provided. Experience alone can teach the many ways in which the rising and sliding front may be used for composing artistic pictures.

Before closing the camera see that the front is properly centered, otherwise there is danger of damaging the bellows when folding.

THE AUTOGRAPHIC KODAK

The Autographic Kodak used with the Autographic Film Cartridge offers the great advantage of making the date and title a part of the negative—and at the time. It forms an indisputable record that will be appreciated more and more as the years go by. Many of our pictures tell the “where” and “who” but the more important question “when” can only be guessed at. Even when the title of a picture is obvious the date should always be put on as a matter of record for future certainty and satisfaction.



The Autographic Kodak has a spring or a sliding door in the back, which covers a narrow slot through which the writing is done (with stylus provided for the purpose) on the red paper protecting the film. This slot is so placed that the title appears in the margin between the exposures, but if it is desired to place the title on the picture itself, a slight turn of the spool key will bring it into that position. If two lines of data are to be written, one can be placed in the margin and the other on the picture, or both may be written on the picture, if so desired. Of course the lower line must be written first. Such titling would appear on the bottom of an upright picture, or at the left-hand end of a horizontal picture.



Negative with Autographic Record

The Autographic Film Cartridge differs from the regular N. C. Film Cartridge in this respect. A thin red, instead of the familiar red and black (duplex) paper is used. This red paper, in itself, is not fully light-proof, but between it and the film is a thin strip of black displacing tissue. This tissue serves the double purpose of light-proofing the cartridge and of permitting the recording, by light, of writing upon the film. When the data has been written on the red paper and printed (by exposing with the door open to the sky for from two to five seconds) the image is photographically impressed on the film and appears when the film strip is developed. In making the prints the title may readily be shown upon the print itself, the letters appearing in white upon a black background in the margin, or it may be omitted from the print, remaining, however, as a permanent record for reference in the negative.

The process of development of the Autographic Film Cartridge is exactly the same as with the Kodak N. C. Film Cartridge.

Autographic Kodaks may be used with the regular Kodak N. C. Film Cartridges. The other models of Kodaks may be used with Autographic Cartridges, but to get Autographic results, you must use an Autographic Kodak and Autographic Film.

To the tourist, to the keeper of the family album, to the careful photographer who wants a record of the conditions under which his pictures were made, to the surveyor, the contractor, the engineer, the Autographic Kodak marks the most important advance that has been made in photography in a score of years.

THE AUTOGRAPHIC RECORD AS A GUIDE

Many amateurs have distinctly improved the quality of their work by making notes, at the time of exposure, of the prevailing conditions. As: Bright light, 1-25 sec., stop No. 8. which, by the way, can be easily abbreviated to: B 1-25, 8. By keeping such records the amateur can quickly find the causes of failure, if any. By comparing negatives and records he will soon discover his errors and when he knows what his errors are, he can easily rectify them. It is obvious that the best way to make these records is autographically—*on the film, at the time.*

Picture Taking

HAVING familiarized yourself with the operation of your camera and its various parts, and studied carefully the sections devoted to the use of stops and exposure, the practical test comes in the taking of the actual picture.

There are, of course, subjects everywhere for your camera, but we would suggest beginning on simple, well-illuminated landscapes, keeping a careful record as to the time of day, stop opening and exposure. (See page 28.) By so doing you will not only be able to correct the errors in your early efforts but will have a practical knowledge of exposure that will be of material value in the solving of the more complex problems of indoor work. It will be well to bear in mind that for all work, including objects in motion, sunlight is necessary. The nearer the object to be photographed is to the camera the more rapid must be the working of the shutter.

PHOTOGRAPHING MOVING OBJECTS

In most instances where the beginner attempts the photographing of moving objects, the result will be disappointing. This is due solely to his lack of appreciation of the circumstances and the actual conditions confronting him. For example, he takes his camera to the race track to photograph a friendly brush between local trotters.

Securing a position just under the wire he waits for the finish, and as the horses rush by at a 2:10 clip he snaps them broadside from a distance of ten feet, and fails to understand why the negative should show nothing but a blur, for he will have nothing else. The reason for his failure is this: if he has a double lens instrument with Kodak Ball-bearing Shutter it has worked in approximately $\frac{1}{50}$ of a second, an apparently very short space of time, but we find on figuring it out that a horse covering a mile in 2:10 covers 40 feet and 8 inches in one second of time or over nine inches in $\frac{1}{50}$ of a second, the time the shutter is open—a sufficient distance to make a most decided blur. The distance the image will move on the plate during exposure is to the distance the object moves, as the focal length of the lens is to the distance from lens to object. In this case we will suppose the focus of the lens to be six inches, and we know the distance from lens to object to be ten feet (120 inches) and the distance the object moves approximately nine inches. We will let X stand for distance image moves on plate and it gives us the following equation: $X : 9 :: 6 : 120 - \frac{1}{10}$. It is obvious that if the object moves $\frac{1}{10}$ of an inch on the plate the picture will be ruined. We find then that in order to take pictures of moving objects at right angles there are two factors of prime importance—the speed of the shutter and the distance from the object. In the ordinary amateur outfit the shutter speed is about $\frac{1}{50}$ of a second, although the Special Kodaks and cameras fitted with Anastigmat lenses have shutters working at a speed of $\frac{1}{100}$ and up to $\frac{1}{300}$ of a second. We must, therefore, get further away from the subject, since experience

has shown that to get successful pictures of rapidly moving horses, autos, etc., from nearby positions and at right angles, the shutter must have a speed of from $\frac{1}{500}$ to $\frac{1}{1000}$ of a second, and these high speeds call for cameras fitted with focal-plane shutters to operate at these high speeds.

An Anastigmat lens with an aperture of, say $f.6.3$, is about sixty per cent. faster than a Rapid Rectilinear lens and will require a shutter working at about $\frac{1}{300}$ of a second to arrest moderately fast motion and get a correctly exposed negative in good light.



But there are tricks in all trades, and satisfactory pictures of rapidly moving objects can be made by photographing them from a position partly in front as well as from a reasonable distance. The accompanying picture of the Empire State Express, traveling at full speed, shows plainly what can be done in this direction. It was made with a Pocket Kodak from a point about one hundred feet from the

spot where the train passed and somewhat ahead of it. By following this method the amateur can soon learn to take pictures of rapidly moving objects and in such a manner as to largely avoid the disagreeable blurring. Of course, it will be appreciated that a few attempts may have to be made before an express train can be properly located on the finder and the shutter released at the proper moment to include all the train in the negative, sixty miles an hour being equal to a thousand inches per second.

In ordinary snapshot work, with comparatively slow exposures, the length of exposure is considered as the most important factor, and while this is essential in photographing rapidly moving objects, the most important factor is the speed of the moving object, because the negative of this object must be sharp to be of any value. Further, it is not the actual speed of the moving object, but the speed with which its image moves across the face of the film, and this speed is increased or diminished according to the angle of movement in relation to the lens. To make this point clear, let us take a man running, at a distance of twenty-five feet. If the line of movement is across the field at right angles to the lens, the movement across the film will be very rapid, but if *towards* the lens the motion of the image is very slight. Unless for some special purpose better negatives and better pictorial effects are produced by photographing from an angle of 45 to 60 degrees. The user of the focal-plane shutter must bear in mind that the shutter curtain aperture has nothing whatever to do with the depth of focus. The shutter is concerned with the speed of the exposure only, and whatever the aperture in the curtain, it will have no influence as to the depth of focus. It is the lens aperture that concerns the

depth of field. This aperture is regulated by means of iris diaphragm or stops, as stated on page 18. The size of the aperture of the stop determines the depth of focus of the lens, that is, the sharpness of definition of objects at varying distances from the camera, and it also necessarily determines the volume of light that passes through the lens in a given period of time. The smaller the aperture of the lens, the greater the depth of focus, but the weaker the volume of light. Therefore, in making very rapid exposures with the focal-plane shutter, it is necessary to use a small *curtain aperture* to obtain sufficient speed to arrest motion, and at the same time the *largest permissible lens diaphragm* to admit the greatest possible volume of light in order that the image be recorded in sufficient strength on the sensitive film to produce a good negative. In making slow, instantaneous exposures a *larger curtain aperture* may be employed, and if the light is strong, a *smaller lens diaphragm*, to increase the depth of focus and secure greater definition.

For the photographing of subjects moving with extreme rapidity, or that must be taken in close proximity to the camera, often requiring exposures as fast as $\frac{1}{1000}$ of a second, a Graflex camera is indispensable. Especially designed for high-speed work, it is equipped with the Graflex Focal Plane Shutter, built into the body of the camera and operating as closely as possible to the face of the plate or film when in position for exposure. Very rapid motion can be arrested even when working at close range.

The focal-plane shutter of the Graflex type is the most efficient photographic shutter. It is built into and becomes part of the camera. Its curtain, with a number of fixed openings ranging from the full size of the negative to an eighth of an inch in width, passes over the plate or film. The length of exposure is regulated by the size of the opening and the speed with which it moves across the focal plane. The smallest opening traveling at the highest speed is adjusted to give an exposure of $\frac{1}{1000}$ of a second. As the opening is increased and the speed decreased the time of exposure is increased, and speeds varying from $\frac{1}{1000}$ to $\frac{1}{10}$ of a second can be given automatically.

Speed Factors It is not so much the actual speed of the object as the apparent movement with which the image of the object passes across the surface of the film. This movement is determined by the actual speed of the object, the angle of movement to the lens, the distance of the object from the lens, and the focal length of the lens.

When these factors are known it is a simple problem to determine the movement of the image over the surface of the film and how fast the shutter must travel to arrest motion.

The same conditions that determine the apparent speed also decide the size of the image, so that a modification of one factor of necessity influences the others.

Size of Image It has been demonstrated that in high-speed work, the best results are secured where the image of a man is about one and one-half inches in height, while the image of a rapidly moving horse should not exceed one inch from shoulder to hoof.

In attempting to arrest rapid motion with a larger image you have to sacrifice both time of exposure and depth of field in the attempt to arrest motion.

Distance of Object

The distance of the object when the photographer can control it, is naturally largely determined by the size of the image wanted and the focal length of the lens used.

When the distance is beyond the operator's control, his only remedy is to use a lens of suitable focal length.

Depth of Lens Field

In ordinary photography, the photographer soon learns that the smaller the lens diaphragm, the greater the depth of field. In high-speed work it is necessary to secure the greatest possible illumination, entailing the use of a large lens opening which limits the depth of field.



The Hurdle Race

In high-speed work, it is not possible to secure perfect definition of all objects in the field and the photographer must be content with securing perfect definition in the portion containing the greatest interest.

An important fact is this—that no matter what the focal length of the lens used, if the photographer will be content with an image $1\frac{1}{2}$ inches in height he will get sufficient depth with the largest aperture of his lens.

It is only when dealing with unusual subjects, such as large or extended groups, that it may be necessary to determine the largest stop that can safely be used and still retain good definition.

SUBJECTS

Children at Play

Action in the ordinary amusements of children is comparatively slow, and extremely short exposures are unnecessary, and in but rare instances will a shutter speed higher than $\frac{1}{100}$ of a second be required. As children average about one-half the height of an adult, to obtain an image one and one-half inches high it will necessitate working somewhat closer to the subject. This naturally lessens the depth of the field, making it necessary to use a smaller stop, about *f*.8 for small groups.

Children's Portraits

Taken in an ordinary room, within six feet of a window open to the clear sky, portraits of children in light-colored dresses may be taken with the largest stop of the lens, with an exposure of from one to three seconds. Out of doors, select a shaded spot, and give an exposure of from $\frac{1}{10}$ to $\frac{1}{25}$ of a second.

Foot Races

It must be taken into consideration that when a man runs 100 yards in ten seconds, this is true of his body only, and that his feet are traveling twice as fast. So in calculating the shutter speed it must be decided whether or not the entire image of the runner is to be perfectly sharp.

With the lens of $8\frac{1}{2}$ inch focus, runners should be photographed at a distance of 35 feet, and if they are moving at right angles to the lens, a shutter speed of $\frac{1}{700}$ of a second will render the body perfectly sharp, but the feet will not be perfectly defined. To get the entire image perfectly sharp an exposure of $\frac{1}{1400}$ of a second would be required.

For the best results, both pictorial and mechanical, photograph your subjects at an angle of about 45 degrees to the lens; the exposures will then be $\frac{1}{500}$ and $\frac{1}{1000}$ respectively.

For long races, a slightly slower shutter speed is permissible, but the largest stop of the lens must always be used.

Baseball and Tennis

If the ball is the objective, use the fastest speed and the distance between it and the player must be 50% greater than when the player is the object. When possible select a point in which the ball travels directly toward or away from the lens.

A base runner should be considered as moving as swiftly as a hundred-yard sprinter. At bases the movement is comparatively slow, and about $\frac{1}{300}$ of a second exposure will be sufficient.

Owing to the similarity of action, what has been said of baseball applies equally well to tennis, except that in tennis the action is not quite so rapid.

Horse Racing

Such subjects should be handled in the same manner as a man running because a horse's hoof, when off the ground, moves twice as fast as his body.

Photograph when possible at an angle of 45 degrees to the lens. Trains should be handled at a distance of not less than 100 feet, so as to include the whole train. Best results are obtained at an angle of 45 degrees or less toward the camera. At 45 degrees $\frac{1}{200}$ of a second will arrest the movement on the film of a train moving at 35 miles an hour, while $\frac{1}{400}$ will be enough for one traveling at the rate of 60 miles. Double these speeds if sharp definition of the wheels is required.

An automobile may be considered as a locomotive, and shutter speeds figured accordingly. At an angle of 45 degrees, the slower machines may be taken at a distance of fifty feet, with an exposure of $\frac{1}{1000}$ of a second.

For higher speeds, it is better to increase the distance in proportion to the speed of the machine, rather than to depend on a faster shutter speed.

Simply because your lens has a large opening do not feel that you must use it. On the other hand, for the sake of increased depth of focus—i. e., sharpness in both near and far objects, use the smallest opening that will give a fully timed negative. Don't use buck-shot for shooting quail—you will be more likely to get quail with bird-shot. The small opening covers a multitude of errors in focusing.

Street Photography

THE successful picturing of street scenes requires both thought and skill on the part of the amateur. He must bear in mind that he will have to work quickly and quietly, attracting as little attention as possible, and he must be able to take in a pleasing and interesting situation at a glance.

This class of work demands perfect understanding of all the workings of the camera, the ability to level and focus quickly, and to expose the instant the conditions are right.

The ability to level the camera quickly and accurately is particularly important, as in most instances the architecture of the surrounding buildings will show, and if the camera is not level, the building lines will be anything but pleasing.

A good many pictures of street scenes show that a number of persons were looking at the camera when the exposure was made. For instance, take a group of youngsters interested in some game, their action, intensity and unconsciousness is what makes the picture. Let them become aware of your purpose, the game stops and all stare at the camera, thus spoiling the opportunity for a successful bit of work.



The holding of the camera during exposure is also important. Many pictures show that the point of view from which they were taken was too low.

The distance upward from the group or object upon which we stand to the level of the eyes, or the point of view from which we see our subject will range, in most cases, from four and one-half to five and one-half feet.

Now if we hold the camera ten inches or so above our knees it can readily be seen that the point of view is radically changed, and that the effect produced upon the eye might be entirely lost if taken from that position. The proper place is against the chest, or as high as we can manage it and still see what is in the finder.

Landscape Photography

IN TAKING up the actual making of the picture we purposely began with the photographing of moving objects, as such subjects are so frequently encountered in landscape work.

By familiarizing yourself with this subject you are forewarned and forearmed as to both the limitations and possibilities of whatever equipment you are using.

In landscape photography we advise against the introduction of human figures, as in nearly all cases they fail, either in costume or in pose, to harmonize with your subject.

The domestic animals, such as horses, cows and sheep, can, however, frequently be introduced with success.

When human figures are introduced, avoid having them look directly at the camera and see that they harmonize with your pictures in pose, or in action.

The physical side of the picture making, exposure and development is much more easily mastered than the artistic.

While it is true that there are some few individuals possessed of an inherent sense of the artistic, most of us have to give, in advance, considerable study and thought before we can produce results even bordering on the artistic.

To fully cover the subject of artistic composition would require more pages than are devoted to this entire book, but we can, in a general way, offer suggestions that will greatly aid in avoiding or overcoming most of the errors apparent in unstudied work.

The great secret of artistic work is simplicity, the avoidance of overcrowding, and the employment of the fewest lines and masses in the composition of your picture. Next in rank to simplicity is harmony and balance, and without these, artistic composition is impossible, and in this connection, it may not be necessary to state that the fewer elements that enter into your picture, the easier it will be to bring them into harmony and balance.

One of the faults most often seen in the work of the beginner in photography is the desire to include too much within the confines of the picture. There is frequently material for two, or even more, complete pictures crowded into one, with the result that the eye wanders confusedly from one point to another, producing a sense of irritation rather than that of pleasure.

First, have a reason for making your picture—either to preserve a record of some interesting place or occasion, to picture the beauty of some bit of land and sky, or to produce a picture appealing to the observer by its beauty of line or tone.

A successful picture may combine all of these qualities, but one is always dominant and there should never be any question as to why it was made.

Composition is not an exact science that can be depended upon mechanically to produce results. We can, nevertheless, apply sufficient of its general principles that, together with the study of good pictures, we will be aided materially in avoiding the inartistic. Bringing things together in an orderly and symmetrical arrangement is perhaps as good a definition of composition as any.

Selection must, however, precede composition, and the first lesson to be learned is to leave out what is not required. Examine any one of your earlier attempts at landscape making and you will find that your negative includes a whole lot of unnecessary things that you failed to observe. In this matter of selection, a good rule is to seek first a good foreground, one that will lead you unobtrusively, yet pleasantly, up to the principal object in your picture.

Choose your view point carefully, remembering that while the painter can eliminate what he desires, you have an almost equal advantage in that you can move your camera to the right or left, up or down, to focus on a different plane, and with different stop openings, to secure the effect you desire.

In perfecting your composition the following underlying principles must be observed:

Your picture must be a dominant figure or object to which all other parts of the picture must be subordinate. There should be some object of secondary interest connected with your principal object. For instance, if your principal object is a clump of trees, a second clump, a little further away; or again, a woman playing with a child or watching an incoming boat—this constitutes the motif of your picture.

Remember always that the background must be subordinate and unobtrusive. Also that there should not be two highlights or deep shadows of equal importance, and that when possible the deepest shadow should meet the highest light. And finally that the most important position in a picture is always more or less towards the center either to the right or left; the exact center should be avoided as this divides the picture into equal parts.

The horizon line, which in most landscapes is the more conspicuous, should never divide the pictures into two equal parts, but should be approximately either one-third from the top or from the bottom. When there are subjects in the near foreground, the line should be about one-third from the top, while for broad expansive views it should be at the same distance from the bottom. With the latter, one should have, if possible, a clouded sky. Clouds are a decided advantage, inasmuch as they break up the monotony of a white sky and add greatly to the beauty and attractiveness of the picture.



The Approaching Storm

Of equal importance with the arrangement of the objects in your picture is the question of lighting, as the lighting determines the strength and position of your lights and shadows. Beginners, **Lighting** as a rule, when making exposures in the sunlight, should have the sun behind the back or over the shoulder, but the advancement of the amateur warrants further information.

Effective pictures may frequently be made by having the sun to one side, and at various times the value of the picture is increased by its being a trifle to the front. (In such case it will be necessary to shade the lens to keep out the direct sunlight during the exposure.)

As an illustration, let us take a tree in the bright sunshine, walk around it and closely observe the different effects of light and shade. You will notice that when you face the tree and the sun is directly behind you that the tree has the appearance of being flat; as you move gradually to the right or left you will see that part of it is in shadow, and as you arrive at an angle of 90 degrees with your first position, you will find that one side is in the sunlight, while the opposite side is in the shadow, and that it stands out with pleasing contrast of light and shade, thus giving depth and roundness.

The shadows should also have careful study. These should be transparent to a degree, always containing detail. Heavy black shadows, devoid of detail, are always a detriment to your composition. When the sun is very bright and the lights are strong while the shadows are black, the result with a snapshot would be too great contrast. This can be overcome by a very, very short time exposure, resulting in a softening of the highlights and an added amount of detail to the shadows. When photographing boats, the point of view to be obtained (if possible) should be such that the shadow effects on the water are made to help the composition.



GROUP 1

Any subject, in which the objects of interest are more than 500 feet from the camera should be classed in Group 1

EXPOSURES FOR OUTDOOR SUBJECTS

Reprinted from "Kodakery"

Nearly all the subjects that are now ordinarily photographed during the daylight hours may be classed in four groups, and, as the exposure that each group requires can be easily memorized, the outdoor exposure problem can be reduced to the single question of determining in which group the subject belongs.

By examining our illustrations, each of which bears the number of the group in which it is classed in the accompanying exposure tables, you can readily decide in which group the subject you wish to photograph belongs, and then, by giving the exposure recommended in the table that applies to the type of camera you are using, you should have no difficulty in obtaining a negative from which good prints can be made.

If the camera has a double lens (such lens will be either a rectilinear or an anastigmat), use the table on page 42.

If the camera is a folding Kodak, Brownie or Premo that has a single lens, with stops marked 1, 2, 3 and 4, use the table on page 44.

If it is a box Brownie or a box Premo, which has only one shutter speed, and has no bellows, use the table on page 45.



GROUP 1

When it is more important to record the shadows on the snow than the detail in dark toned objects give the exposure recommended for Group 1



GROUP 2

A typical ordinary landscape scene, showing sky, with prominent foreground objects

The exposures recommended are neither the shortest nor the longest that will give good results with Kodak film, the latitude of which is so great that it will take care of any reasonable error in exposure. They are averages that have been obtained from a comparison of thousands of exposures and they are as good for use on sunny days in winter as on days of summer sunshine.

When the day is cloudy bright the exposures should be from two to three times as long, and when the day is dull the exposures should be from four to eight times as long as those mentioned in the tables.



GROUP 2

When boats along shore are pictured at short range they should be classed in Group 2

OUTDOOR EXPOSURE TABLE FOR CAMERAS THAT HAVE RECTILINEAR OR ANASTIGMAT LENSES.

For 2½ hours after sunrise until 2½ hours before sunset on days when the sun is shining

	Shutter Speed	Rectilinear Lenses Stop	Anastigmat Lenses Stop
GROUP 1—Snow, Marine, Beach Scenes			<i>f.</i>
Extremely Distant Landscapes	½ ₂₅	32	22
GROUP 2—Ordinary Landscapes Showing Sky, with a Principal Object in the Foreground	½ ₂₅	16	16
GROUP 3—Nearby Landscapes Showing Little or no Sky—Groups, Street Scenes	½ ₂₅	8	11
GROUP 4—Portraits in the Open Shade, not under Trees or the Roof of a Porch—Shaded Nearby Scenes	½ ₂₅	4	7.7 or 8



GROUP 3

A nearby landscape showing little sky



GROUP 3

The exposure recommended for groups is intended only for stationary figures. This picture suggests but it does not actually represent subjects that are moving



GROUP 4

Nearby Dark Toned Subjects which are not wholly in sunshine should be classed in Group 4

EXPOSURE TABLE FOR THE FOLDING KODAK, BROWNIE AND PREMO
CAMERAS THAT HAVE SINGLE LENSES

For 2½ hours after sunrise until 2½ hours before sunset on days when the sun is shining

	Shutter Speed	Stop
GROUP 1—Snow, Marine and Beach Scenes—Extremely Distant Landscapes	½s	3
GROUP 2—Ordinary Landscapes Showing Sky, with a Principal Object in the Foreground	½s	2
GROUP 3—Nearby Landscapes Showing Little or no Sky—Groups, Street Scenes	½s	1
GROUP 4—Portraits in the Open Shade, not under Trees or the Roof of a Porch—Shaded Nearby Scenes	1 second	4



GROUP 4

When making Portraits or Story-Telling Pictures in the shadow of a building or a tree with nothing but the sky above the subjects, the exposures recommended for Group 4 should be given

OUTDOOR EXPOSURE TABLE FOR FIXED FOCUS BOX CAMERAS THAT HAVE SINGLE LENSES

For 2½ hours after sunrise until 2½ hours before sunset on days when the sun is shining

- GROUP 1—Snow, Marine and Beach Scenes—
Extremely Distant Landscapes. Snapshot with Second Stop
- GROUP 2—Ordinary Landscapes Showing
Sky, with a Principal Object in
the Foreground. Snapshot with Largest Stop
- GROUP 3—Nearby Landscapes Showing
Little or no Sky—Groups, Street
Scenes. Snapshot with Largest Stop
- GROUP 4—Portraits in the Open Shade,
not under Trees or the Roof of a
Porch—Shaded Nearby Scenes. 1 second with Third Stop

To make a time exposure with a fixed focus Brownie Camera, draw out the time slide and, with a fixed focus Premo, move the time lever over to "T." It takes two movements of the shutter lever for making a time exposure—one pressure for opening the shutter and another for closing it.

It takes about one second to mentally pronounce "one hundred and one."

MOVING OBJECTS

While all of the combinations of stops and shutter speeds that are recommended in the preceding tables are eminently satisfactory for photographing stationary objects, all of them are not adapted for photographing moving objects.

It is obvious that sharp pictures of moving objects can only be secured with short exposures. A good exposure rule, when using a compact hand camera for picturing anything that is moving, is to use the largest stop and give the shortest exposure that the camera can make. The subject must, of course, be in bright sunshine.

The risk of movement showing in a negative is lessened as the distance between the camera and the moving object is increased, and it is also lessened as the angle at which the object moves across the field of view is reduced. To illustrate: If the object is moving at right angles to the camera, at a speed of ten miles an hour, it should be photographed at a distance of seventy-five feet or more. If it is moving diagonally across the field of view it may be photographed at a distance of fifty feet, while if it is moving directly toward or away from the camera it can be photographed at a distance of about forty feet, with the assurance of equally sharp images of the object being obtained in each case.

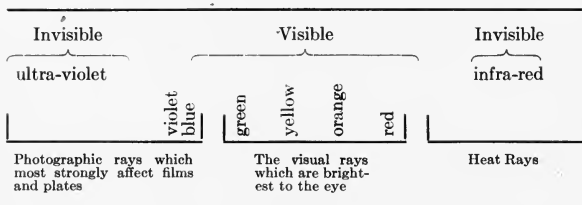
The most pleasing pictures of moving objects are usually obtained when the subject is moving diagonally across the field of view.

THE USE OF COLOR FILTERS

The light of the sun is known as white light and consists of all colors. When a ray of white light is passed through a prism the light is bent, and as the colors are bent to different extents they are separated and some of them become visible. The colors we can then readily distinguish are violet, blue, green, yellow, orange and red.

In addition to these, sunlight also contains rays that are ordinarily invisible, but some of which can, with special apparatus, be made visible. These are known as the ultra-violet and the infra-red. The infra-red, being heat rays, are of no importance in photography, but the ultra-violet, which are light rays, are of very great importance.

The colors of which white light is composed appear in the order shown in the diagram:



While all the colors pass through the lens and reach the plate when we make an exposure by daylight, if no filter is used, and while the film or plate would, if exposed long enough, be affected by all these colors, it is so much more strongly affected by blue, violet and ultra-violet that these latter colors impress the image of the subject on the film long before the other colors can affect it, and, were we to expose the film long enough for the other colors also to affect it, the negative would be ruined through excessive over-exposure. This means that when we make a negative on an ordinary plate of a subject illuminated by daylight, the image we obtain in the negative was made almost solely by the blue, violet and ultra-violet, and this is why, when we use an ordinary plate and photograph a landscape above which is a blue sky with white clouds, and expose long enough for recording detail in a nearby object, both clouds and sky appear white in the print.

In order to overcome this and make blue photograph darker than white we must use a film or plate that is affected by green and yellow at the same time it is being affected by blue, violet and ultra-violet. Kodak film, being orthochromatic (corrected for color), is affected at the same time by these colors; but, since all films and all plates, no matter how highly they may be corrected for color, still remain most sensitive to blue, violet and ultra-violet, these colors will affect them much more strongly than the other colors can unless we subdue these colors by using a suitable orthochromatic filter, through which the light must pass before it reaches the film or plate.

The function of an orthochromatic filter is, therefore, to prevent part of the blue and violet from passing through it, thus more nearly equalizing the effect the various colors have on the film or plate during the period of exposure.

Since the orthochromatic filter prevents part of the blue and violet from passing through, it cuts out part of the light that would affect the film or plate if no filter was used, and, consequently, it increases the exposure that must be given. The increase of exposure required depends on how much of the blue and violet the filter cuts out and also on how sensitive the film or plate is to the light which the filter lets through.

If we had a film, for instance, which had its sensitiveness in two equal portions, half the total sensitiveness being to the green, yellow, orange and red, and half to the blue and violet, then, if we used a filter which cut out all the blue and violet but allowed all the green, yellow, orange and red to pass through, the exposure with the filter would be only twice that needed without the filter; but, if the sensitiveness of the film was only $\frac{1}{5}$ to the green, yellow, orange and red and $\frac{4}{5}$ to the blue and violet, the exposure with a filter that cut out all the blue and violet but passed all the green, yellow, orange and red, would be five times that needed without the filter.

It is not desirable to make film strongly sensitive to red because if it was it would be too slow for present day requirements in snapshot work, even when no filter was used, and it would be very difficult to handle in the dark-room. Tank development by daylight would be impossible. It would be fogged by even a very weak red light; none but an experienced photographer could judge the density of the negative during development before the extremely dim special green safelight needed for tray development and, after tank development, the film would have to be transferred to the fixing bath in a light-tight dark-room and precaution taken against light reaching the film for some time after it was placed in the fixing bath.

From the foregoing it is evident that calling a filter a three times or a five times filter means practically nothing unless the conditions under which the filter is to be used are stated.

The number of times exposure must be increased when a filter is used is called the multiplying factor, or the filter factor.

The multiplying factors given by the Eastman Kodak Company for the filters of their manufacture are calculated for exposures that will record shadow detail. For instance, should the exposure that will record shadow detail be 1 second without a filter and 7 seconds with a filter, the Eastman Kodak Company would give this filter a factor of 7.

When the Kodak Color Filter is used for photographing landscapes, and the best rendering of clouds and sky is preferred to detail in nearby objects on the landscape, a factor of 3 will be ample, but when detail in dark colored, nearby objects is desired, and when flowers

are photographed at short range, the exposure through the filter should be 7 times as long as the exposure that would be needed without the filter.

In the purchase and use of a filter the photographer should make sure of the basis used by the manufacturer in naming his factors. If he uses the sky as a basis and gives his filter a factor of 3 it would necessarily follow that the landscape factor would be considerably more than 3.

SNAPSHOTS OF DISTANT CLOUDS AND NEARBY LANDSCAPES

When there are clouds above the landscape you should get them in your print.

The only clouds it is difficult to record in a photograph when the exposure is timed for securing detail in a nearby landscape are the white clouds that are outlined against a light blue sky. The customary method of recording these is to use a filter which usually prolongs the exposure so much that the picture will be blurred if the camera is held in the hands.

The Kodak Sky Filter will record both clouds and landscape so the picture will not be blurred when the camera is held in the hands. With its use fully timed negatives can be made with snapshot exposures that are only about twice as long as would be needed if no filter was used. This means that if an exposure of $\frac{1}{25}$ of a second, with stop 16, is correct without a filter, an exposure of $\frac{1}{25}$ of a second, with stop No. 8 (*f*.11), will be about correct when the Kodak Sky Filter is used.

The reason why the Kodak Sky Filter permits the recording of both clouds and landscape with snapshot exposures is that the intensity of the light reflected by the sky is reduced in passing through the yellow upper part of this filter, while the light from the nearby landscape passes through the lower part, which is not colored. This results in balancing the lights that pass through the lens so they will be recorded by the film or plate in nearly the same values that are seen by the eye.

The Kodak Sky Filter is not intended to take the place of the regular Kodak Color Filter. The regular Kodak Color Filter should be used in all cases where improved renderings of blue and yellow are desired throughout the entire picture area. It is also intended for photographing landscapes with clouds when longer than snapshot exposures can be given, but whenever snapshots are to be made, without a tripod, of landscapes with clouds above them, the Kodak Sky Filter can be used to advantage.

Architectural and Interior Photography

THE amateur, and particularly the tourist, frequently encounters architectural subjects possessing most interesting features from the structural or historic point of view.

In straight architectural work full detail is essential and in most cases entails the use of small stop openings, and a time exposure.

This branch of the work makes imperative the absolute leveling of the camera, in order to avoid distortion, and the worker should likewise carefully read the instructions regarding the rising and sliding front, as this attachment is most valuable in this work when used intelligently.

A diagonal, rather than a full front view of a building, will usually be found the more pleasing, particularly so if a portion of the building is in shadow.

In detail work, the position of the camera is important: Doorways and windows should be taken in full front, if taken from one side the correct effect of the top is often lost.

Exposures should be ample, especially for interior work, as an under-timed negative will not only fail to bring out the detail but the contrasts will be too great.

Kodak Film will be found especially valuable for this class of work on account of its non-halation and orthochromatic qualities.

In photographing interiors, such as the ordinary living room of a home, some thought must be given as to the arrangement of the portion of the room to be pictured. By all means avoid crowding; do not attempt to include all the furniture in the room within the confines of your picture, and be careful that the larger objects, such as heavy chairs or tables, do not come in the immediate foreground as they will then photograph out of proportion.

If the pictures on the wall are glazed, avoid, if possible, reflections from the glass; such reflections can frequently be avoided by drawing down one of the window shades.

When possible photograph across the light coming from a window, rather than directly toward it, as by so doing you will obtain better gradation and avoid the halation as well.

Take plenty of time in selecting your view point and in arrangement, and give plenty of time for the exposure. Lean toward over-exposure rather than under-exposure to secure full details in the shadows.

Photographing Interiors

Reprinted from "Kodakery"

PLACING the camera on a tripod and making time exposures by the daylight that enters through doors and windows is the simplest way of photographing rooms in the home.

Those who have observed that the light is strong in some parts of a room and weak in other parts may doubt that good results can be obtained by so simple a method.

The secret of success lies in controlling the light by raising or lowering the window shades and opening or closing doors so the light will be as uniform as possible in those parts of the room that are to be photographed, and in always having the light come from behind the camera or from any one or more sides *excepting that side of the room toward which the lens is pointed*. It is also necessary to give an exposure that is long enough for recording detail in all but the darkest shadows.



Fig. 1.—Made at 10 A. M.; stop, $f.22$; 3 minutes.

Our illustrations are from photographs that were made by this method. The rooms were photographed on a day of bright sunshine. The only change made in the arrangement of the rooms was the removal of such furniture as was too near the camera.



Fig. 2.—Made at 11 A. M.; stop, $f.32$; 6 minutes.

Fig. 1 was made at 10 a. m. The walls, ceiling and woodwork were light colored. The light came from the east, through one window and one open door, both of which were behind the camera. The south wall is shown on the left side of the picture. The staircase is along the west wall. Though the shades on the staircase windows were drawn down they were so light colored that the outlines of the window sashes could be seen through the shades.

Fig. 2 shows another view of the same room. The open doorway is in the north wall. The light came from the right side of the camera. The strongest light that entered the room beyond the doorway came through windows at the left, which could not be seen from the position of the camera.

The walls, ceiling and furnishings recorded in Fig. 3 were very dark. The sun was shining directly against the windows shown in the picture, thus casting shadows of the window bars on the dark colored shades. This picture was made by the light that came through two large bay windows that were opposite each other. The shadows on the floor show that a much stronger light came through the windows on the left than through those on the right side of the camera.

Fig. 4 shows parts of three rooms. The view is looking east. The farthest room was lighted by windows on the north, east and south sides and the other rooms by north and south windows. The shrubbery, faintly seen above the fern, was outdoors in the shade and very close to the building.

The unique effects shown in Figs. 5 and 6, which were made on a dull day, were obtained by making an exposure indoors for the outdoor view that is seen through the closed windows.



Fig. 3.—Made at 3 P. M.; stop, 16; 10 minutes.

When photographing interiors it is imperative to observe the following rules:

The camera must be placed on a tripod or other rigid support for making time exposures. If time exposures are made with the camera held in the hands the picture will be blurred, and if snapshots are made the negatives will be under-exposed.

The camera must be *level*, so that the vertical lines of the walls, as seen in the finder, are parallel with the sides of the finder, or the picture will show the walls tapering.

More of the floor than of the ceiling must be shown, or the room will appear to be top-heavy.

Before making the exposure place your head squarely in front of the lens and look for reflections in pictures or mirrors (note the reflection in the picture above the mantel in Fig. 3) and, if any are seen, place a wad of paper behind one corner of the frame, thus changing its angle. A slight change of angle will not be noticed in the picture. Never use a large stop or part of the picture will be out of focus.

Never place furniture in the foreground near the camera, or it will appear too large in comparison with the furniture that is farther from the lens.

Do not include a lot of furniture within the field of view, or the picture will suggest that the room is crowded. Make different views of the same room, with each piece of furniture as nearly as possible in its accustomed place.

To determine the exposures for interiors we must know whether our camera has a double or a single lens. The front combination of a double lens is in front of the shutter and is visible whether the shutter is open or closed, while a single lens is placed behind the shutter and is not visible when the shutter is closed.

With all double-lens hand cameras use stop 16, and with all single-lens cameras that have no stop marked 16, use the second stop and give the exposures recommended in the following:



Fig. 4.—Made at 4. P M.; stop, *f*.22; 2 minutes.

EXPOSURE TABLE FOR PHOTOGRAPHING INTERIORS

White walls and more than one window:

bright sun outside, 4 seconds;	cloudy bright, 20 seconds;
hazy sun, 10 seconds;	cloudy dull, 40 seconds.

White walls and only one window:

bright sun outside, 6 seconds;	cloudy bright, 30 seconds;
hazy sun, 15 seconds;	cloudy dull, 60 seconds.

Medium colored walls and hangings and more than one window:

bright sun outside, 8 seconds;	cloudy bright, 40 seconds;
hazy sun, 20 seconds;	cloudy dull, 80 seconds.

Medium colored walls and hangings and only one window:

bright sun outside, 12 seconds;	cloudy bright, 60 seconds;
hazy sun, 30 seconds;	cloudy dull, 120 seconds.

Dark colored walls and hangings and more than one window:

bright sun outside, 20 seconds;	cloudy bright, 80 seconds;
hazy sun, 40 seconds;	cloudy dull, 2 minutes, 40 seconds

Dark colored walls and hangings and only one window:

bright sun outside, 40 seconds;	cloudy bright, 2 minutes, 40 seconds;
hazy sun, 80 seconds;	cloudy dull, 5 minutes, 20 seconds.

This table is calculated for rooms where windows receive the unobstructed light from the sky, and for exposures made not earlier than three hours after sunrise or later than three hours before sunset.

When the next smaller stop than the one mentioned, on either single or double lens camera is used, give twice the exposure stated in the table.

If in doubt whether the walls and hangings of the room should be classed as medium or dark colored give the exposure recommended for dark colored walls and hangings.

Conditions will vary greatly in different rooms, but no



Fig. 5.—Made at 10 A. M.; very cloudy; stop, *f.22*; 5 seconds



Fig. 6.—Made at 10 A. M.; cloudy day; stop, *f.22*; 10 seconds

matter what the conditions may be, if the rooms contain one or more windows you can make good pictures of parts of such rooms by the method we have described.

The R. O. C. Tripod Truck (see page 85), is a most convenient accessory when a tripod is employed indoors.

The truck is fitted with castors, making it a very simple matter to move the camera about the room to any position.



Photographed against the sunlight but with the
photographer's body shading the lens

Home Portraiture

BEFORE making exposures in and around the home, it is most essential that the Kodaker understands the power of light so that

The Photographic Value of Light may come within the limits of the latitude of

the film, and approach the normal or correct exposure as nearly as possible.

The beginner is very apt to be misled into estimating his exposure according to the visual rather than the actinic power of the light; in other words, a light that appears exceedingly bright and powerful to the eye may have but



White accessories are very helpful in shortening exposures



An unposed pose

weak recording power on the sensitive film. The actinic power of the light is diminished by refraction and absorption. As an example, examine the light on a bright, sunny afternoon about two o'clock. Outdoors in this light you will be able to produce a fully-timed negative in $\frac{1}{100}$ of a second at stop 8. Now enter a room on the sunny side of the house, one having large plate glass windows, with white walls and white woodwork; the light appears, if anything, brighter than outdoors. Make an exposure, with the same speed and stop opening, placing the subject close to the window, and you will find upon development that this exposure is very much under-timed. In this case the loss of actinic power of the light is due to the refraction and absorption of the light rays by the window glass, and to the fact that there is no direct expos-

ure to the light of the whole sky. To obtain a negative equal in density to the first one, you will have to give an exposure of from one to two seconds, or one hundred to two hundred times as long as for the exposure just the other side of that deceptive piece of glass.



A snapshot made possible by light reflected from below

Next make an exposure in the light dining-room, with its bright red rug, and bright red wall paper—two seconds exposure should be plenty. Well, what *is* the matter? Same speed and stop were used and the light was just as good as in that white room, and you had a bad under-exposure. Could the color of the rug and wall paper have had anything to do with it? You guessed right. Anything red in color has the power to absorb a great portion of the light rays that would have an effect on your film—you know your dark-room lamp is fitted with a ruby glass. With the white walls you are aided by the light reflected back from their surfaces in just about the same proportions as your other exposure was lengthened by the absorbing power of the red walls and floor covering.

Now try two further experiments. Take your subject outside again, on the shady side of the house, but where you can obtain direct illumination from the sky. To your eyes, this location would seem to require a longer exposure than the one in the room with the white walls, but try an exposure of 1-10 second. This develops up about normal. Now as a final experiment move your subject

up on the veranda, just far enough back so that the direct light from the sky cannot be utilized. The illumination appears to be just as good here as the previous exposure, but to be on the safe side try two exposures, one of 1-10 second, just the same as for your last outdoor exposure, and one of $\frac{1}{2}$ second; the 1-10 second exposure is very much under-exposed, and the $\frac{1}{2}$ second could have been increased to one second without danger of much over-timing.



A picture where detail in the surroundings is permissible.

These few experiments will serve fairly well as a working basis for future exposures, but, of course, during the shorter days and in cloudy weather, the exposure will have to be proportionately increased.

In the somewhat contrasty light usually encountered it is better to err on the side of over-exposure, as this not only affords better shadow detail, but the consequent tendency to flatness overcomes much of the contrast.

Of course, in photographing small children, time exposures of any appreciable duration are out of the question, but even in such cases it is well to risk movement rather than under-exposure.

Portrait Quality There is quite a difference between a portrait and a map. A portrait should be not only a correct likeness, but should present the subject in a pleasing pose, subduing defects and accentuating the strongest characteristics.

A portrait to be pleasing must avoid harsh contrasts and possess full gradation from highest light to deepest shadow, consequently you must so arrange your subject and light as to produce this effect. In your previous experiments you acquired some knowledge of the intensity value of light, you can now experiment a little in regard to its quality.

Placing your subject close to the window, with the light full on the face, you see that all parts are equally illuminated and with consequently no gradation. Now move the subject back a few feet, the light immediately softens, and you obtain a roundness and modeling far more pleasing.



Accessories often aid in giving point to the pose

Turning the subject's head partly away from the light increases the steps in gradation, only the part of the face in deepest shadow appears too dark and without detail.

Illuminating this shadow is very simple. Take a large white towel, and hold it about four feet away from the shadow side, it lightens it up a little, but not quite enough, so walk slowly towards the subject until this shadow is sufficiently illuminated to bridge that big gap in gradation.

All you have to do now is to pin this towel to the back of a tall chair or anything else handy and you have as satisfactory a reflector as one could wish.

Before attempting any exposures place your subject in various parts of the room and study the effects you can produce.

One thing to remember is this, that the light intensity value increases and decreases by the square of the distance from the source of the light; that is to say, if you find the correct exposure two feet from the window is three seconds, four feet from the window will demand an exposure of nine seconds to secure equal density in your negative.

Always use the strongest light that you can consistently with the effect you desire to produce, as prolonged exposures not only detract from the spontaneity of expression and pose, but make your subject uncomfortable and liable to move.

Light Control

The preceding experiments have had to do only with the technical side of portrait making, and therefore you have experimented only with the recording power of the light. In order that you may make your pictures artistic you must learn how to control and direct the light just where you want it to produce the desired effect.

Controlling the light is a very simple matter, and entails no extra apparatus beyond a few sheets of paper or cloth, and a few pins or thumb tacks for holding them in position.

It is generally accepted that allowing the light to fall on the face at an angle of forty-five degrees produces the most natural effect, and you can easily secure this illumination by simply blocking up the lower half of the window.

Other methods of lighting can be used successfully, of course, and some most charming effects can be produced by allowing the light to come from other angles.

Now with the lower portion of the window curtained, and the reflector placed in the proper position, you have your light under good control for head and shoulders or half-length portraits, but suppose you want to make a full length portrait with the subject attired in dark costume; in this case you have either to move your subject further back from the window, use a semi-transparent curtain for blocking the lower half of the window, or use a second reflector to reflect the light upon such portions of the subject as require it.

The simplest way is, of course, to move the subject back from the window until the light covers the figure fully, but in some cases this will extend the duration of the exposure beyond the practical limit, when one of the other two alternatives must be employed.

Bleached cheese cloth may be used for blocking the window when it is necessary to admit some light through the lower portion of the window, and for reflecting light up from the floor a sheet placed on a chair, or sometimes just spread on the floor, will answer the purpose.

In portraiture you must always bear in mind that the face is the most important element in the picture, and consequently you must subordinate all other parts; this is a comparatively easy matter when your subject is attired in dark costume, but when the clothing is white or nearly so, you must devise some means for subduing it to its proper key without loss of its natural softness and brilliancy.

Sometimes an absolutely opaque curtain for the lower half of the window will suffice, but more often it will stop too much light, and in such cases you may resort to the very simple expedient of using a piece of yellow cheese cloth for curtaining off the lower portion of the window, employing one or more thicknesses, as the occasion demands.

When the costume is dark the illumination and exposure must be sufficient to show detail in the figure and texture in the garment and with white or light costumes the light must be soft enough so as not to render chalky whites without detail.

Correct development of the exposures will do much in accomplishing these results, and will be explained in its proper place.

Posing Nine hundred and ninety-nine children out of every thousand are naturally graceful and will pose themselves far better than you can—and right here remember two “don’ts”—first, don’t be in a hurry, and, second, don’t be fussy. And patience—you must be Job plus.

The tactful Kodaker can coax his little subjects to the proper place for the exposure, and then wait till the proper moment arrives.

When you were a youngster didn’t you “just hate” to have any one fussing with or at you, pulling down your skirts or straightening your necktie or slicking back your hair or saying, “Don’t do that, Jimmie,” or “Take your finger out of your mouth, Susie”? Just remember your own childish likes and dislikes when picturing the kiddies.



An example of attractive composition.

If you have a pre-conceived idea for a picture, the only way you can carry it out successfully is to get the youngster or youngsters interested in it; in fact, to play some game with them that will finally work them into the arrangement and pose you desire.

Most youngsters when told to do any particular thing have a pre-adamite desire to do just the opposite.

When attempting to photograph children who are not familiar with the Kodak or the process, place the Kodak in position and then go about doing something else for a little while until they become accustomed to its presence, even allowing them to handle it if they so desire.

Simple costumes photograph best, and the children feel more at home in them. White and the lighter colors are specially well adapted for children's costumes, not only adding to the youth of the subjects but allowing you to make a shorter exposure.

When it comes to the grown-ups a certain amount of posing is necessary, though as you become accustomed to the work it may be minimized by so arranging the seat they are to occupy, or the other incidentals of your picture, that they will involuntarily assume the pose desired.

Suggestions for Posing A successful portrait depends upon more than correct lighting, exposure and development. Full length and three-quarter length portraits seem to express more of the individuality of the subjects; but the more of your subject you include in your picture the more difficulties you will encounter. In every instance there is one side of the subject's face that will photograph better than the other, and when possible determine this point before placing your subject in front of the Kodak.



A tree in blossom directly outside of the window, shielded the light from the Kodak lens. Diagram No. 1.

Whether the portrait shall be full face, three-quarter or profile will be determined, of course, by which viewpoint the subject shows to the best advantage.

With persons having fairly regular features and good complexion it frequently happens that good portraits can be obtained from almost any angle, but in most cases you will find it necessary to subdue some feature or strongly accentuate some others to produce the best effect.

As an example take a young man with very prominent ears; it is obvious in this case that the full face would be displeasing, so, turn the face slowly away from the light until the ear nearest the light disappears from the line of sight.

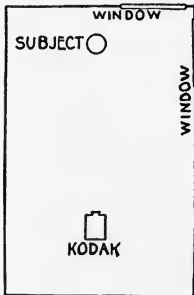


Diagram No. 1

The ear on the shadow side is, of course, subdued by the shadow, and if still too prominent you can, as one expedient, have your subject rest his head on his hand, placing the hand just forward of the ear, or the shadow can be deepened by removing the reflector to a greater distance from that side of the face.

Sometimes the chin is a little weak; tilting the head slightly upward will help, or the chin can be rested on the hand—a profile of course is not to be considered. Double chins can be treated in the same way.

Now take a subject with a massive lower jaw; place him squarely facing the



A conversational pose

Kodak and you will note that the head outline is nearly rectangular. Request him to turn his head slowly away from the light, and stop at the point where the head outline presents an oval form; it may also be necessary to tilt the head up or down a trifle to produce the most satisfactory view.

When the subject has a very thin face or high cheek bones, the light should be so directed upon the face as to fall just below the point of the cheek bone; this may be easily accomplished by lowering the window shade, blocking the window a little or moving the subject just a trifle further from the light.

You quite often encounter a subject with deep set eyes, or wish to make a picture with the hat shadowing the face. In such cases, to afford sufficient illumination to the eyes, you must turn the subject more toward the light or use a supplementary reflector.

Bald heads are easy; have some one hold a sheet of cardboard over the head between the light and the bright spot, just out of range of the lens.

Particular attention should always be paid to the eyes, as the entire facial expression depends so much upon them. Have them in good focus, and avoid double catch lights. When eyeglasses are worn be very particular to see that the glasses do not show a blur from reflected light. If the glasses do show a blur when viewed with your head directly in front of the lens, turn the sitter's face slightly either way, until the blur vanishes.

When portraying the full figure, you naturally have a few more things to consider. One exceedingly important point is that curves, not angles, make for beauty and harmony.

Don't fuss much with your subject. If the figure is to be seated, request the subject to be seated, and you will usually find that a quick pat here and there will get rid of any ungainly angles—if not, stop right there and invent some excuse to have the subject stand up for a moment, and then again be seated—it doesn't take much to bore even the most willing subject and too much fussing will destroy all chances of success.



Simple costumes photograph best



A simple window lighting



Just a snapshot

For head and shoulder portraits, a perfectly plain ground is desirable utilizing the wall of the room when covered with plain paper, or suspending some plain fabric, drawn taut to prevent wrinkles, behind the subject when the wall covering is objectionable.

For full figures and groups some detail in the background is permissible, but in any case it must be subdued, and in no way attract the attention from the portrait part of your picture.

In a good many of the little home pictures detail in the background and accessories is worth while, provided it is not too prominent.

Take for instance a group around the piano; lack of detail in the piano would be foolish; or if you were making a picture of the kiddies playing in the nursery, detail in the wall and furnishings in the room would be in harmony with your pictures.

Detail is all right so long as it does not detract from the human interest in your picture.

Developing Tank Development, first, last and all the time, not only for portraiture but for every sort of exposure, as it is not only the simplest and easiest method, but gives the best possible results.

Watch the hands carefully and do not have them too far forward from the body or they will then photograph out of proportion with the face. The hand partially closed usually presents a better appearance than when clinched or with fingers extended.

Remember always that the face is the most important part of your picture, and that all lines should lead up to it, and all other parts should be subordinated.

These few suggestions will help you to avoid the more common errors, and to realize the necessity for you studying your subject and knowing what you want to do before you make the exposure.

Back-grounds A badly chosen background will ruin the finest portrait work, so it is most important that thought be given to this portion of your picture.



Have your picture tell a story



A dignified, yet thoroughly natural pose. Diagram No. 2.

Reflectors and that sort of thing are not of much account in this class of work nor can you do much in the way of fancy lightings, but you can produce a goodly amount of most satisfactory work, with comparatively little effort.

Spacing and Trimming It is a rule among painters that the picture must fill the canvas; in other words, anything that is not of interest or is detrimental to the chief object in the picture must not be included. In some instances, however, it is not possible to place the subject or the camera so as to include only what is wanted; the remedy then

Develop for twenty minutes, as this seems to give just the right printing quality for portraiture. If however, you employ the dark-room method do not carry your development quite as far as for landscapes, and especially so when your subjects are gowned in white, as too long development is apt to clog up the whites and prevent the correct rendering of detail in the print.

Printing A desirable companion for the Kodak Film Tank is the Kodak Amateur Printer, a printer that fits in very nicely with the Kodak scheme of simplicity and efficiency.

Outdoor Portraiture Outdoor portraits should never be made where the full light of the sun falls. Select a spot away from the sun, but one where the direct light from the sky will fall upon your subject. The light is softest before ten in the morning and after four in the afternoon.

This refers to the summer months, the winter months are not altogether favorable for making outdoor portraits.

A clump of shrubbery makes an excellent background if the subject is placed several feet in front of it, and the lens used with a large opening.

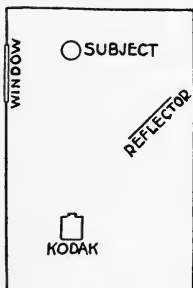


Diagram No. 2

is to trim your print till only the true picture remains.

A few suggestions in spacing may not come amiss:

In full or three-quarter length portraits a very short person may be made to appear taller by spacing the picture so that the head comes close to the top of the print; a low chair or table will also serve to produce this effect. Persons of unusually large size are a bit careful as to the furniture upon which they trust their weight, so it may be unnecessary for us to suggest refraining from the use of small or frail furniture when posing such subjects. In spacing pictures of children allow a little more space at the top than for adults, as this gives a better impression of their size.

Some very good artists claim that it is permissible to cut off part of the head or head gear in the picture but never the feet or hands. Usually all of these important parts can be included without detriment to the picture.

Too much blank space around your subject is almost as bad as too much detail, and some small object, such as a picture or vase, can be introduced, provided it is so placed as not to interfere with the rest of the composition.

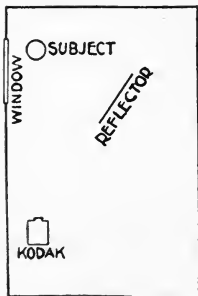


Diagram No. 3



Baby's interest held by something outside the window. Diagram No. 3.

The more you study the art of filling your space the less trimming you will have to do, but when you *do* have to trim, trim mercilessly.

Mounting Just as many good photographs have been spoiled by bad mounting as paintings have been spoiled by inappropriate framing. As the mount forms the setting for your picture, some thought must be given to its selection, both as to color, shade and size.

Fortunately most of the mount manufacturers have given a good deal of time and thought to the production of



Full illumination with but very short exposure. Diagram No. 3.



A flash-light portrait—Eastman Flash Sheet. Diagram No. 4.

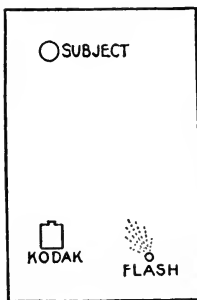


Diagram No. 4.

harmonious and appropriate mountings for all classes of work, so the danger of inappropriate selection is largely minimized.

One of the first things to consider is color. The color of the mount must harmonize with the tone of the print. Black and white prints should not be mounted on brown or any of the warmer shades; select rather one of the soft grays, black or white. Where the print contains very strong high-lights a pure white mount may be used, but when the tones are subdued the use of gray is advised as the strong white would degrade the high-lights of your soft print. Black mounts may be used with prints containing deep shadows, for the same reason. With warmer toned prints, such as sepias,



Made with Kodak focused at 8 feet without Portrait Attachment.



Made with Kodak and Kodak Portrait Attachment focused at 3½ feet.

browns and dark purples, the various shades of brown, green and even subdued reds may be used to advantage.

The Kodak Portrait Attachment

The Kodak Portrait Attachment is simply an extra lens so mounted as to slip over the front of the regular Kodak lens.

With this little attachment in place one can work close to the subject, and obtain large head and shoulder portraits. But this is by no means the extent of its usefulness, as it can be used for photographing small animals, flowers and the like, obtaining much larger images than are possible without its use.

The illustrations on this page most clearly demonstrate its usefulness in portraiture.

Some of the Pictures

Now let us call to your attention some of the illustrations that help to bring out the points in the text. And, as you study these pictures, you will see how simple they are, and how they were made under conditions that can be duplicated in practically every home.

The picture on page 56 was taken almost directly against the sunlight. Although very pretty lighting effects may often be secured

in this way, proper care should always be taken to guard against halation. In this case the photographer stood between the lens and the light, that is, the shadow of his body was cast over the lens while the exposure was being made.

In the picture on page 63 you will notice that most of the light comes from the window directly opposite the subject and not included in the angle of view of the Kodak (see diagram). The window facing the Kodak is screened by blossoms outside. The lens is therefore cutting across the light, a very satisfactory arrangement.

The picture on page 70 shows a simple method of producing the full illumination demanded for very short exposures by working close to and almost against the light.

When the picture on page 69 was made the attention of the baby was held by having one of the other youngsters go outside and throw snowballs against the side of the house. Usually some little trick like this will save the day when orthodox methods fail.

In this picture, as in others throughout the book where a window is included in the angle of view of the Kodak, the light of the sky was screened from the lens so as to prevent halation. In this particular case, a projecting wing of the house served as a screen. Remember that it is the point of view of the lens that concerns you.

A simple and very satisfactory method of utilizing the Eastman Flash Sheets for flash-light portraiture is shown on page 71. The position of subject, Kodak and flash is indicated in the accompanying diagram.

The pictures on page 72 demonstrate the wonderful possibilities of the little Kodak Portrait Attachment, when used with ordinary outdoor lighting, by following the simple methods outlined. Bear in mind, however, the fact that at such short range, the distances must be absolutely accurate. Use a tape measure, measuring from the lens to the eyes of the subject.

The picture on page 62 is an example of home portraiture with the Kodak Portrait Attachment. For similar informal pictures place the camera at the correct distance from the subject (four feet in the case of our illustration), and make the exposure at a favorable moment.

The illustrations on pages 58, 65 and 67 are just little outdoor pictures—yes, just “snapshots”, but they possess a naturalness that makes Daddy, away from home, mighty glad to pull them out and look them over pretty often.

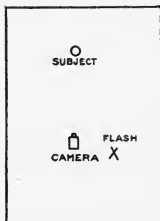
None of the illustrations lay claim to being masterpieces. They were all made under ordinary light conditions, with a Kodak and on Kodak Film, and any one can produce equally successful results by following the instructions in your Kodak manual and the few additional pointers offered here.

Flash-light Portraiture

THE flash-light has done much to broaden the sphere of the amateur photographer. It has made him absolutely independent of daylight for the making of portraits and other indoor pictures, and has even made possible the taking of certain classes of outdoor pictures at night.

As the amateur has comprehended the artistic possibilities of flash-light for illumination, and how simply all lightings may be obtained, he has in some instances practically abandoned daylight for portrait making.

In this chapter we will confine ourselves to the use of the Eastman Flash Sheets and the Eastman Spreader Flash Cartridges, as these afford the simplest means for amateur flash-light illumination.



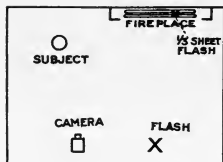
One Eastman Spreader Flash Cartridge

7 feet from subject

7 feet from floor.

Medium dark walls.

Subject 6 feet from camera.



Two flashes, total exposure about two seconds.

One-half No. 3 Eastman Flash Sheet in fireplace.

One-half No. 3 Eastman Flash Sheet three feet to right of subject six feet from floor.

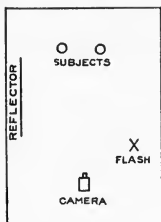
Dark walls.

Subject 12 feet from camera.

Flash Sheet in fireplace should be placed behind a piece of wood or cardboard to prevent glare.

**What a
Flash-light
Is**

A flash-light is the illumination secured by the ignition and combustion of certain chemical compounds, or by the passing of pure magnesium through a flame. The illumination thus produced is of powerful actinic quality, and of extremely brief duration, and unless handled understandingly, is apt to produce too great contrasts in lighting to be satisfactory to artistic tastes. It is, however, a very simple matter to place and control your flash-light so as to make it much more certain than daylight and to yield exactly the proper degrees of contrast or softness.



One Eastman Spreader Flash Cartridge.

7 feet from subjects, 3 feet from floor.

White cotton cloth reflector.

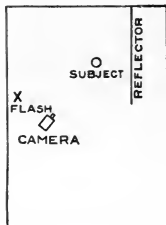
Medium dark walls.

Subjects 8 feet from camera.

**Flash-light
and
Daylight**

For work in the open, or well-lighted interiors, daylight is, of course, highly satisfactory, as we are accustomed to its strength, and can, in a sufficiently accurate manner determine the length of exposure. On the other hand, and particularly in the making of portraits, the amateur

is usually confined to the use of rooms improperly or insufficiently illuminated for his purpose. With daylight, even though he possesses unusual ability in arranging and controlling his light, he is often handicapped by being unable to direct his light to just the proper point or to obtain it in sufficient volume just when he needs it. With the proper flash-light the amateur, after but a few experiments, is dealing with an absolutely known quantity. He knows to a certainty just how much illumination each flash sheet or each flash cartridge will provide, and that he may direct his light to fall absolutely in the desired place, as he may place his flash so that the rays of light will proceed in any direction.



One Eastman Spreader Flash Cartridge.

6 feet from subject.

2 feet higher than subject's head.

White oilcloth reflector behind subject.

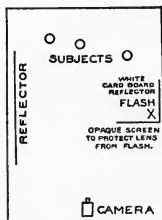
Cheesecloth screen between flash and subject.

Dark walls.

Subject 6 feet from camera.

In making a portrait with the aid of a flash-light, we must remember that we are attempting to duplicate the action of daylight, and consequently the same rules that apply to daylight portrait making will be necessary.

As previously stated, a portrait must not only be a good likeness, but to be pleasing, must in addition, present the subject in the most favorable pose and lighting without undue contrasts, and with good gradation between the highest lights and deepest shadows. It may be accepted that the most pleasing illumination is secured by allowing the light to fall on the features at an angle of forty-five degrees, though exceptions to this rule may be made as explained later. In making a portrait by daylight you could not expect to secure results by placing



One No. 3 Eastman Flash Sheet.

8 feet from subjects, 7 feet from floor

With cotton cloth reflector.

Flash placed in angle of two large sheets of cardboard to act as reflector and to shield lens from flash.

Medium dark walls.

Subjects 12 feet from camera.

your subject and camera in any position regardless of the light, but rather would have to spend some time in placing your subject and in arranging the control of your light so that it falls in the proper place. When using flash-light, the same precautions must be observed, only your task will be easier, as you may always be sure of the requisite amount of light and also of your ability to control it.

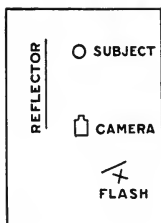
The essentials of flash-light picture making are few: The Kodak and film, a firm and easily adjusted support for the camera during exposure (preferably a tripod, with corks on the spikes on the legs to prevent slipping, or an R. O. C. Tripod Truck specially designed for this purpose), a package of Eastman Flash Sheets or Eastman Spreader Flash Cartridges, according to the work in hand, a screen or filter for diffusing the light and a simple reflector for softening shadows. When the flash is at a considerable distance from the subject, a reflector behind the light may be used advantageously to increase the volume of light, instead of a screen before it to diffuse the light.

For all ordinary work, in rooms of average size, we recommend the Eastman Flash Sheets and Kodak Flash Sheet Holder. The sheets are exceedingly simple to handle and requiring about one second to consume, afford a broad, soft light. In photographing children, or any subject likely to move during the exposure, we advise the use of the Eastman Spreader Flash Cartridges, as they are instantaneous and give a brilliant, powerful light. As some subjects are apt to become nervous during your preparations for the exposure, do not neglect to reassure them, and avoid all appearance of nervousness yourself, proceeding calmly and slowly with each operation. When using daylight for illumination, the subject must be placed with regard to the window opening, but with flash-light the subject may be placed anywhere in the room, as most convenient, and with the camera at the proper distance the flash may be placed in any position necessary to produce the desired lighting.

A convenient method of using the Eastman Flash Sheets is to provide a strip of wood about eight feet long and about the thickness of an ordinary lath, to which the flash sheet may be pinned; this strip may be tied to the back of a chair, in an upright position, as it then can be easily moved to any point in the room. But the safest and simplest way of using flash sheets is by means of the Kodak Flash Sheet Holder, which takes care of every emergency.



It may be held in the hand, always between you and the flash sheet. Or the handle may be unscrewed and the holder attached



One No. 3 Eastman Flash Sheet

7 feet from subject

7 feet from floor.

White cotton cloth reflector.

Lens shielded by sheet of cardboard during exposure.

Medium colored walls.

Made with Kodak Portrait attachment.

Stop U. S. 8.

Subject $3\frac{1}{2}$ feet from camera.

to any ordinary tripod being provided with a socket for that purpose.

The sheet is placed in position in the center of the larger pan over the round opening, which has a raised saw-tooth edge extending halfway around it. Press with the thumb on the sheet, so that a slight break is made and a portion of the sheet projects partially through the opening. Then to insure the sheet being more securely fastened, press around the notched edge, forcing this portion of flash sheet firmly into position on the pan.



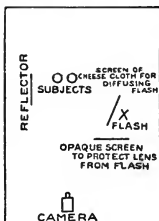
Then to set off the flash, merely insert a lighted match, from behind, through the round opening in the center.

It is obvious that with this holder the flash can be held in any position or at any height in the room and it is a very great convenience. The white fireproof lining of the Kodak Flash Sheet Holder acts as a reflector and will increase the strength of the light.

Never place more than one sheet in the Kodak Flash Sheet Holder at a time. If two or more are used, one will be liable to blow off and drop on the floor while still burning.



When using flash-light cartridges, handle them with care and according to directions, as the contents are, by their very nature, highly inflammable. A convenient method of using the Eastman Spreader Flash Cartridge in connection with the Spreader Pistol is to take a strip of wood about eight feet long, and fasten the pistol to one end with nails or screws. Then by attaching a short piece of picture wire to the trigger of the pistol, and letting it run down the side of the stick to the other end, you have an exceedingly simple and handy flash machine. With this device the operator may remain near the camera and watch the subject from the same point of view as the lens, and at the proper moment place the light just where he wants it. Before attempting this method be sure that no lace curtains or other inflammable materials are apt to come within reach of the flame, as the light spreads out from the cartridge quite a distance. In addition to the light, another most important requisite for doing good flash-light work is a film or plate which is rapid, ortho-



Eastman Flash Sheets.

5 feet from subjects, 6 feet from floor.

White cotton cloth reflector.

Cheesecloth screen between flash and subjects.

Medium dark walls.

Subjects 10 feet from camera.

chromatic and non-halation. Do not attempt to make a flash-light portrait on any film or plate not possessing these qualities, and as they are all combined in Kodak Film, it is the ideal medium for this work.

Now as to the actual work. We will assume that it is evening, but suggest, if daytime be selected, that you do not have too much daylight in the room. Pull down the window shades and turn on the lights, as if it were evening. When making the exposure do not turn down the lights, but leave them burning brightly. The light will do no harm, and will prevent the dilation of the pupils of the eyes of the subject and avoid the stare so often in evidence in flash-light pictures. The color of the walls and ceiling and the size of the room will have much to do with the result. Select, if possible, a room of medium size, with light-colored walls and ceiling; this will produce a general diffusion of the light and aid greatly in softening the effect. The first thing to be considered is the size of the flash sheet to be used and its position.

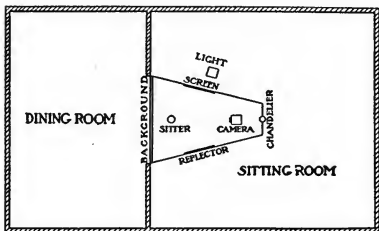
The Eastman Flash Sheets are made in three sizes, 3 x 4, 4 x 5, and 5 x 7 inches, and numbered one, two and three, according to size. The proper size of the sheet to use will be determined by the complexion of the subject, the color of the room, and the distance of the light from the subject. For example, if the subject is of fair complexion, with light hair and white dress, and if the room is of medium size and light walls and hangings, a No. 1 Flash Sheet would be sufficient, placed at a distance of about six feet. For medium complexions use a No. 2 sheet, and for very dark, a No. 3, or put the No. 2 sheet a little closer to the subject. The further the subject is from the light, the softer the effect. Strong, bold lightings are obtained by placing the light close to the subject.

As a basis to work from: Six feet is about the proper distance for the best results in average cases. At a distance of eight feet, to secure full illumination, use a No. 3 Flash Sheet, and for any distance less than six feet a No. 1 Flash Sheet will give sufficient light under average conditions. The light may be placed anywhere except within immediate range of the lens, but its exact position will depend upon the style of lighting desired, and the individual characteristics of the subject. An idea prevails among beginners that the light should never be placed anywhere except behind the camera, as it might cause a reflection of light into the lens, but the light may be placed anywhere except inside the limits of the picture without trouble from reflections. In some instances an opaque screen may have to be used, to cut off such rays of light as would reflect into the lens, but these cases are so obvious as not to demand further explanation. A common error among beginners is that they do not place the light high enough. If the light is placed six feet distant from the subject, it should be placed about three feet higher than the head of the subject, in order to give correct modeling of the features, and the desired softness. There are exceptions to this rule, as in the case of a subject with deep-set eyes and heavy eyebrows, or a subject with a large hat, when it is desired that the hat should not cast a shadow on the face. In such cases the light should be lower. A reflector and screen are important aids in obtaining artistic results. It is obvious

that unless some means are provided to equalize the lighting on the sides of the face, the contrast will be too strong, and the "chalk and soot effect" will be much in evidence. The reflector for softening contrasts is a simple contrivance. For a bust portrait, with the subject seated, a white towel fastened over the back of a high-backed chair will serve the purpose; do not place the reflector too low, as the reflected light coming up from below will be apt to flatten the shadow side of the face. The reflector should also be placed a little forward of the sitter, as this affords better half-tones between the highest lights and shadows, and also serves to prevent any stray rays of light from reflecting into the lens. With standing figures, a small sheet or any light-colored material (except yellow or red) may be hung over a string or tape fastened across any part of the room, with thumb tacks, so that it occupies the desired position. The light screen or filter can be similarly arranged on another tape. This screen should be of white cheesecloth, and at least a yard square. A convenient method is to tack the cloth to a light wooden frame, about a yard square. If a tripod socket be inserted in one side of the frame, an extra tripod may be utilized to hold the screen in any desired position.

The diagram below illustrates one of the many ways in which the reflector and light screen or filter may be used.

Many houses have arches or folding doors between the rooms, with portieres which may be utilized for a background, attaching one end of the reflector and screen by strings or tapes to each end of the curtain pole, and tying the other ends to the chandelier, usually found above the center of the room. Every room has a number of door or window casings, to the side of which a pin or



tack may be driven without damage, and these offer sufficient opportunity for varying the arrangement shown in the diagram, to obtain exactly the lighting desired.

Let us now arrange our subject for an exposure, taking for example a lighting and pose similar to the one on page 82. If you are using a flash sheet without the Kodak Flash Sheet Holder, you should ignite the flash sheet by means of a match fastened in a split stick, at least two feet long, or better still, with one of the long-handled gas lighters provided with a wax taper. All being in readiness, open the shutter and quickly light the flash sheet; as soon as it is consumed, close the shutter. Do not hurry, as the illumination given by the gas flame or electric light will not make any impression on your film in the short time necessary to close the shutter after the exposure has been made.

Tank development is the ideal method for development of flash-light exposures, as it not only brings out everything the exposure is capable of yielding, but the negatives will have just the right quality for portraiture.

The R. O. C. Tripod Truck is a most convenient accessory for flash-light and other work, where a tripod is employed indoors.

Placed on this, the tripod legs are held firmly in position by quick acting spring catches, and of course there is no possibility of slipping or the tripod spikes marring floor or carpet.

The truck is fitted with castors, making it a very simple matter to move the camera about the room to any position. Folds compactly when not in use and is perfectly solid when extended.



SUMMARY

The following summary of conditions necessary for successful results must be given careful consideration:

- | | |
|-------------------------------|--|
| 1. Correct Lighting | a—Position of light. |
| | b—Proper diffusion of light by screen. |
| | c—Distance of light from subject. |
| | d—Proper placing of reflector. |
| 2. Correct Exposure | a—Size of flash. |
| | b—Size and color of room. |
| | c—Color of subject. |
| | d—Distance of light from subject. |
| 3. Correct Development | a—Suitable developing formula. |
| | b—Proper strength of developer. |
| | c—Duration of development. |

The illustrations for this chapter were all made on Kodak Film, and with either the Eastman Flash Sheets or Eastman Spreader Flash Cartridges.

The diagrams accompanying the illustrations fully explain just how each picture was made, and the amateur following the simple instructions should experience no difficulty in producing equally successful results.

INTERIORS BY FLASH-LIGHT

The foregoing chapter thoroughly covers the ground of Flash-light Portraiture, but we wish to follow it up with a few remarks upon flash-light work in a general way. Aside from the making of portraits there are many uses for the flash-light.

Frequently it is desired to take a photograph of an interior, which, by reason of a lack of illumination, or because some window which cannot be covered comes within range of the camera, is impracticable by daylight. In such cases a flash-light solves the problem. Again, it is desired to photograph a very large room which is lighted from only one side by daylight. To get a fully timed exposure in the darkest corner of the room would cause a decided over-exposure near the windows. A flash-light, concealed from direct line with the lens by some article of furniture or by a screen, illuminates the dark corner and gives a properly lighted exposure of the entire room.

These are the ordinary uses of the flash-light, and by following the simple rules laid down, the amateur can make pictures with as great an assurance of success as when making snapshots out of doors. For the production of unusual effects, however, one must study all the conditions, weighing carefully cause and effect, and must not yield to disappointment if success is not obtained at first.

There are many ways in which the flash may be made to co-operate with other artificial light, or with daylight, to produce a unique or artistic effect, and to the serious worker it offers another means to the end desired by all photographic workers—pictorial effect.

The Eastman Flash Sheets provide a simple and effective method of producing the flash. Being of great actinic power they impress the image upon the sensitive surface of the film or plate quickly, although the flash is less blinding than that of ordinary powders.

The fact that flash sheets burn slowly as compared with flash powder makes them far safer to use—the danger from explosion by careless handling being reduced to a minimum.

For photographing dark corners when photographing interiors by daylight, for portraiture and small groups, the Eastman Flash Sheets afford an ideal means of illumination, but for large rooms and for groups of ten or more persons, the Eastman No. 3 Flash Cartridges should be employed, as they give a great amount of light. Except for extra large rooms or groups the No. 2 Cartridge will provide sufficient light with stop 16.

For interior work, the Eastman Flash Sheets may be used according to the following table:

Subject at 10 feet and light walls and hangings	use one	No. 1 sheet
" " 10 " " dark " " " " "	" "	No. 2 sheet
" " 15 " " light " " " " "	" "	No. 2 sheet
" " 15 " " dark " " " " "	" "	No. 3 sheet

As stated on page 81, two or more flash sheets should never be superimposed one upon the other, or a number of sheets be pinned with corners over-lapping, as the combustion is somewhat rapid and

there is the possibility of a sheet blowing off and dropping on the floor while burning.

Groups Arrange the chairs in the form of a semi-circle, facing the camera, so that each chair will be exactly the same distance from the camera. Half the persons composing the group should be seated and the rest should stand behind the chairs. In case any of the subjects are seated on the floor the limbs should be drawn up close to the body, not extended towards the camera. If this is not done the feet will appear abnormally large in the picture.

It is better to have the room lighted in the regular way while making the flash. Arrange the persons composing the group so that no one's face will be shadowed by another's body or head. This can be done readily by looking at the group from where the flash is to be fired.

Have the flash-light high enough so that the shadows of heads against the background will not be thrown up higher than the heads.

Taking Large Groups In taking large groups it is necessary to have the camera a considerable distance away. In such a case, to light the group sufficiently with the flash behind the camera, a strong flash would be necessary.

This may be obviated in cases where the camera can be placed in an adjoining room, where there are double parlors, for instance. Then set off the flash in the room where the group is, it being shielded from the lens by the projecting partition. This gets the light close to the subject. In this way a much weaker flash would suffice.

Back-grounds In making single portraits or groups, care should be taken to have a suitable background against which the figures will show, in relief. A light background is better than a dark one, and often a single figure or two will show up well against a lace curtain. For larger groups a medium light wall will be suitable.

The finder of the camera will help the photographer to compose the group so as to get the best effect. In order to make the image visible in the finder, the room must be well lighted with artificial light which may be left on while the picture is being made, provided none of the lights are so placed that they show in the finder.

In General In portrait work it is always best to have the room well lighted when making the flash, if it can be done in such a way that none of the lights come within range of the lens. If the room is darkened the sudden flash of light so strains the eyes of the sitters that it almost invariably gives them a staring look, but if the room is already well illuminated by gas or electricity, the strain is not great and the eyes will have a natural expression. Of course, when the room is brightly lighted, the shutter should not be opened until the instant before the flash is made, and should be closed quickly after the flash is over.

In making portraits by flash-light, the camera should not be held in the hand, but should be supported as described on page 79. Before setting off the flash see that no articles of furniture in range of the

lens are closer to the camera than the persons to be photographed. The nearer an object is to the lens, of course, the larger the picture. A chair placed too near the camera might appear in the picture bigger than anything else visible.

Flash-light work is usually regarded as of minor importance compared with daytime photography, which may be explained by the fact that most people have not made themselves familiar with it. As a matter of fact it well repays considerable time and study, in view of the results that are possible. Some professional photographers now are using the flash-light extensively in their regular portrait work.

When more than one flash-light picture is to be taken, the windows should be opened and time allowed between each flash to free the room thoroughly from smoke, otherwise all the pictures after the first one are liable to have a "foggy" effect. The Eastman Flash Sheets give a minimum of smoke, but the lens is even keener than the eye, and what will seem to be but little smoke in a room, will often have a decided effect upon the picture.

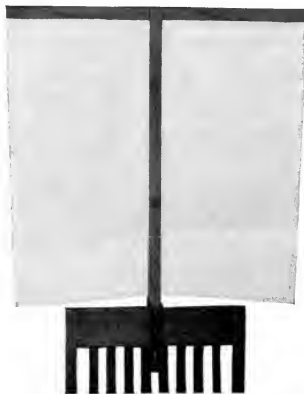


Fig. 1

When, for any reason, it is necessary that the shutter remain closed until the instant the flash is discharged and be closed again instantly afterward, it is well to have the flash sheet hanging near so that the shutter can be operated with one hand and the flash with the other and their action thus made simultaneous.

In using the flash sheets it should be borne in mind that they are not instantaneous, and in portrait work the subject should, therefore, be warned to keep still as if for a time exposure.

The flash sheets do not produce a sudden flash when they are lighted, and a second or so is consumed in burning a single sheet. As compared with the ordinary flash powder they give a much broader source of light, which means that they do away with the harsh shadows that are so objectionable in most flash-light work. The flash from the sheets is far less blinding than that from the ordinary powder, a decided advantage in giving pictures without the staring effect to the eyes so often seen.

The Reflector

In the various articles on Portraiture the use of the reflector is explained. In practice it is often inconvenient or undesirable to secure an assistant for the purpose of holding the cloth to be used as a reflector.

Fig. 1 shows a reflector which may be easily constructed and which will be found very convenient to use. Provide two pieces of wood about one inch wide by half an inch thick, one piece being about two feet and the other two feet six inches long. In one end of the longer piece insert a screw eye with a head about half an inch in diameter. Cut an opening in the center of the second strip so that the head of the screw eye will fit it snugly. A small flat hook fastened to the strip completes the joint. Procure a piece of white cotton cloth about two feet square and fasten it to the edge of the short strip with small tacks. A larger rubber band completes the outfit.

For use fasten the two strips together by the joint and fasten the screen by the aid of the rubber band to the back of an ordinary chair. The cloth will then hang straight down and by moving the chair about and changing the height of the screen by sliding the upright piece up or down, the reflector may readily be placed in any desired position.

Development

THE amateur has the choice of two methods of development: Tank development or dark-room development.

The user of a roll film camera is particularly fortunate in that he may make use of the Kodak Film Tank, and thus perform the entire operation of development in full daylight.

The Kodak Developing Box for Kodak Cut Film, the Eastman Plate Tank for plates and the Film Pack Tank for film pack films, require the use of the dark-room for placing the films or plates in the developer, after which development can be carried on in full daylight, except in the case of the Kodak Developing Box which has no light-tight cover.

The time-temperature method of development—developing for a definite time, with a given strength of developer, and at a given temperature—the foundation of the tank system of development, has long passed the experimental stage. Tank development is no longer a theory—it is a success.

There is every reason for the adoption of this simple method for the development of film or plates. First and foremost, it gives better results than the old tentative dark-room method, even in the hands of the expert.

The tank prevents accidents, such as light fog and scratches; it protects the novice from his own inexperience—the experience is in the tank.

Tank development takes care of all differences of exposure within reasonable limits. Indeed, it has now been fully demonstrated that normal development, such as the tank gives, produces better printing negatives than does the old method of endeavoring to force under-exposures and restrain over-exposures. Snapshots and time exposures go into the tank at the same time and come out together, developed to their full value. No individual treatment is necessary.

Tank development offers greater convenience and comfort. With cartridge film it is daylight all the way, and with plates and Kodak Film Pack the dark-room is necessary only while loading the tank, and for washing before fixing—operations requiring but a few moments.

Tank development is the most economical method of development—time saving, as you may develop a dozen plates, or cut films or a full roll of film, at one time; film and plate saving, as it insures the highest percentage of good printing negatives; space saving, as any one of the tanks for either film or plates will occupy but a corner of an ordinary suit case.

The fact that many of the most noted professional photographers in the country have adopted the Eastman Plate Tank for their developing, is one of the best evidences of the superiority of the tank system. To these men the convenience of tank development is a secondary consideration. What their business depends upon is results, and they find by actual experience that tank development produces a better quality of negatives than does the old method.

The dark-room method of film development is simple, but the amateur has naturally to depend upon his own judgment of the proper density and must take precautions as to a safe light to work by. As improvements calling for slight changes in the methods of manipulation are frequently made in Kodak apparatus, the operator of a Kodak Film Tank should read carefully the manual accompanying the particular tank he purchases.

The preparation of an Autographic Film Cartridge for development and the method of developing it in the Kodak Film Tank is precisely the same as for the regular Kodak film cartridge.

The Autographic Film Cartridge is made with a thin red instead of the familiar thick red and black (duplex) paper. The thin red paper is not light-proof in itself. Between it and the film is inserted a strip of tissue. The tissue serves two purposes: To supplement the red paper in light-proofing the cartridge, and to permit the recording by light, of the writing upon the film. Where "duplex" paper is mentioned in the following instructions, the thin red paper is meant, if developing an Autographic Film Cartridge.

WITH THE KODAK FILM TANK

The Kodak Film Tank consists of a wooden box, a light-proof apron, a transferring reel, a metal solution cup, in which the film is developed, a hollow spindle, two axles, and a hooked rod for lifting the transferring reel to expel air bubbles. There is also a dummy film cartridge which should be experimented with before using an exposed cartridge. The

various parts of the outfit come packed in the box itself, with the exception of the "2½-inch." The solution cup in this case is too large in diameter to fit into the box.



Fig. 1

1. Take everything out of the box. Take the apron and transferring reel out of the solution cup.

Setting Up the Film Tank

2. The axles marked C and D in the cut are to be inserted in the holes in the front of the box. The front will be toward you when the spool carrier in end of box is at your right. These axles are interchangeable. The axle "C" must

be pushed through the hollow spindle which will be found loose in the box. This spindle has a lug at each end to which the hooks of the apron are to be attached.



Fig. 2

passes, by means of the metal hooks which are to be engaged with the lugs on the spindle. (Fig. 2.) The corrugated side of the rubber bands is to be beneath the apron when it is attached. Turn to the left on axle "C" and wind the entire apron on to the axle, maintaining a slight tension on the apron, in so doing, by resting one hand on it.

When developing Vest Pocket Kodak Film, insert spool bearings (extensions at end of spool) in openings in spool carrier—see Fig. 1, and proceed in the usual manner.

Due to the small size of the flanges at the ends of spool carrier in the "Brownie" Kodak Film Tank, they are not perforated, and therefore the Vest Pocket Cartridges cannot be developed in this Tank unless a spool adapter for Vest Pocket and No. 0 Brownie Film is used.

5. Insert the film cartridge in spool carrier (Fig. 3) and close up the movable arm against the end of the spool. Have the duplex paper ("B" in Fig. 1) lead from the top.



Fig. 3

3. The axle "D" must be pushed through the hollow rod of the transferring reel to hold reel in position as indicated in the illustration. The flanges at each end of the transferring reel are marked "Y" in the illustration. Both axles "C" and "D" must be pushed clear through into the holes on the opposite side of the box.

4. Attach one end of the apron to the spindle, through which axle "C"

The method of threading the film and apron in the Vest Pocket and Brownie Kodak Film Tank differs slightly from the larger size tanks, so it will be necessary to follow closely the instructions that are included with each tank.

Important Film to be used in the Kodak Film Tank must be fastened to the duplex paper at both ends. All Kodak films are fastened at one end in the factory.

The operation of fastening the other end can be accomplished in the following manner.

Just before you are ready to develop (holding spool with the unprinted side of the duplex paper up) unroll the duplex paper carefully until you uncover the piece of gummed paper which is fastened to end of film and is to be used as a means of fastening film to duplex paper. Moisten the gummed side of sticker evenly across the end and stick it down to duplex paper, rubbing thoroughly to secure perfect adhesion. Wind the end of the duplex paper on the spool again and the cartridge is ready to insert in the spool carrier.



Fig. 4

6. Thread the paper underneath wire guard on transferring reel through which axle "D" passes (Fig. 4) and turn axle slowly to right until the word "stop" appears on duplex paper.

7. Now hook apron to lugs on transferring reel (Fig. 5) in precisely the same manner that you hooked the opposite end to lugs on the spindle, except that axle "D" turns to the right.

8. Turn the handle half a revolution so that the apron becomes firmly attached and put the cover on the box. Turn axle "D" slowly and steadily until duplex paper, film and apron are rolled up together on reel. As soon as this is completed the handle will turn very freely.

While turning axle "D" to the right, keep pressure on axle "C" in the opposite direction. This will act as a brake and will keep the apron, film and duplex paper taut and in the correct position.



Fig. 3.

9. Prepare developer as described on page 96.

10. Remove the cover from the box and take hold of the duplex paper where it projects beyond the end of the apron. Then wind axle "D" until the duplex paper becomes taut. Unless this is done there is a chance of the film touching portions of the apron and causing non-development of that part of the film.

Note—Where the film is so short that the duplex paper does not extend beyond the end of the apron, the instructions in paragraph 10 are unnecessary.



Fig. 6

11. Draw out axle "D" (Fig. 6), holding apron and duplex paper with the other hand to keep end of apron and paper from loosening. Remove entire transferring reel, containing apron, duplex paper and film (which is freed by pulling out axle "D") and slip a small rubber band around the apron tightly so that there will be no possibility of its unwinding. In removing reel do not squeeze the apron, as by doing so there will be a tendency for it to buckle.

12. Insert the transferring reel (containing apron, duplex paper and film) in the previously prepared developer immediately.

13. Having filled solution cup as directed on page 96, lower transferring reel into cup, with the end containing cross-bar up. (Fig. 7.) Let reel slide down slowly.* The operation of removing reel from box can be done in the light of an ordinary room, but for safety it is well that the light should not be too bright. The total length of time for development is 20 minutes at a temperature of 65 degrees Fahr.

Then place the cover on the cup (Fig. 9), putting lugs on cover into the grooves and tighten cover down by turning to right.

Now turn the entire cup end for end and place in a tray or saucer to catch any slight leakage.



Fig. 7

*Immediately after lowering reel into solution cup, catch it with wire hook and move slowly up and down two or three times, taking care, however, not to raise any part of reel above the surface of solution (Fig. 8). This is to expel air bubbles.

At the end of three minutes again reverse the cup, and, thereafter, reverse every three minutes until the time of development (20 minutes at 65 degrees Fahr.) has elapsed.

Turning the solution cup in this manner allows the developer to act evenly and adds brilliancy and snap to the negatives.

14. When development is completed pour out developer and fill cup with clear, cold water and pour off, repeating this operation three times to wash the film.

When removing cover of solution cup, place cup in palm of hand so as to obtain a firm grip on bottom of cup. Then grip cover with other hand and turn slowly to left when cover will loosen readily. After rinsing the film remove transferring reel; separate film from apron and duplex paper and place immediately in the fixing bath, which should be in readiness, prepared in accordance with directions on page 98.

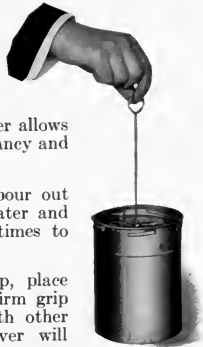


Fig. 8

The film may be separated from duplex paper in the subdued light of an ordinary room if the developer is thoroughly washed out. The operation of separating film and duplex paper should be done over a bowl, bathtub, or sink.

When the duplex paper does not free itself readily from back of film, split the paper where possible; this will remove the hard outer surface of the paper, the remaining portion will soon become soaked and can then be removed easily by rubbing gently, *while immersed*, with the ball of the finger.



Fig. 9

This sticking of the duplex paper to the film is invariably caused by the use of too warm a developer.

If on developing an Autographic Film Cartridge any pieces of the tissue or paper stick to the film when it goes into the fixing bath, they must be removed by gently rubbing with the wet finger before the film is washed and dried.

After developing a roll of film the apron must be wiped dry before developing another roll. The apron will dry almost instantly if immersed for a moment in hot water. Be careful, however, not to use extremely hot water or the apron will be liable to crack. Keep apron wound on axle "D" when not in use. Never leave apron soaking in water.

Developing Several Rolls of Film at Once

Several rolls of film may be developed at the same time if the operator wishes. To do this it is necessary to have a "Duplicating Outfit" consisting of a solution cup and cover, a transferring reel and an apron for each additional roll of film to be developed. The extra rolls of film may then be wound on to the transferring reels as previously described and immersed in the solution cups.

Preparing the Developer

We recommend the use of a Pyro developer. The Kodak Tank Developer Powders, put up by us are Pyro developer powders which are prepared especially for use with our film and the Kodak Film Tank. They are made from Eastman Tested Chemicals.

Fill the solution cup with water (not exceeding 70 degrees Fahr.) to the embossed ring—not to the top. Test the temperature of the water with a thermometer. Pour out from four to eight ounces of the water that is in the solution cup into a graduate or glass and dissolve in it the contents of the red package, containing Sodium Sulphite and Sodium Carbonate. When this powder is dissolved, then add the contents of the blue package, containing Pyro. After this is dissolved pour it back into the solution cup and stir the solution thoroughly. The developer is now ready for use.

The film should be developed for the length of time the table recommends for the temperature of the developer. (See table on page 97.)

If some of the Pyro which is in the blue package sticks to the paper, dip the paper into the solution so that all the Pyro will be added to the developer. The developer must always be mixed fresh and used for only one roll of film.

Temperature of the developer must not exceed 70 degrees Fahr. as above that point there is danger of the emulsion loosening from its support.

It is not advisable to use water that is colder than 50 degrees Fahr., as below this temperature the chemicals will dissolve too slowly and the time of development is too long for practical work, and even at this temperature the powder must be finely crushed and added slowly to the water.

TIME AND TEMPERATURE FOR TANK DEVELOPMENT

After the developer has been properly prepared, as described above, *test the temperature with a thermometer*. Best results are obtained when the temperature of the developer is between 60 and 70 degrees F.

When the temperature of the developer is exactly 70 degrees Fahr., develop the film fifteen minutes, then for every degree colder than 70 degrees, add one minute to the time for development. For example: if the developer is 65 degrees, develop the film 20 minutes; if 62 degrees, develop 23 minutes, etc.

Table of Time and Temperature for Tank Development.

Temperature	Time (One Powder)
70 Degrees . . .	15 Minutes
69 " . . .	16 "
68 " . . .	17 "
67 " . . .	18 "
66 " . . .	19 "
65 " . . .	20 "
64 " . . .	21 "
63 " . . .	22 "
62 " . . .	23 "
61 " . . .	24 "
60 " . . .	25 "
59 " . . .	26 "
58 " . . .	27 "
57 " . . .	28 "
56 " . . .	29 "
55 " . . .	30 "
54 " . . .	31 "
53 " . . .	32 "
52 " . . .	33 "
51 " . . .	34 "
50 " . . .	35 "

FORMULAE

Those who prefer to mix their own developer may do so, but care must be exercised in securing absolutely pure chemicals and correct weights.

DEVELOPER FORMULAE

"BROWNIE" TANK

Sodium Sulphite (E. K. Co.).....	20 grains
Sodium Carbonate (E. K. Co.).....	25 "
Pyro.....	10 "

2½ AND 3½-INCH TANKS

Sodium Sulphite (E. K. Co.).....	44 grains
Sodium Carbonate (E. K. Co.).....	55 "
Pyro.....	22 "

5 AND 7-INCH TANKS

Sodium Sulphite (E. K. Co.).....	64 grains
Sodium Carbonate (E. K. Co.).....	80 "
Pyro.....	32 "

Dissolve the chemicals in the order as given above, and in the manner as described on opposite page.

Temperature of Developer should be between 60 and 70 degrees Fahr., for the best results.

If *other* brands of desiccated Sodium Carbonate are used a greater quantity will be required. If crystals are used, take about three times the quantity of Carbonate and double the quantity of Sulphite.

Short De- If it is desired to shorten the time of development good results may be obtained by using two pairs of powders or doubling all the quantities in the above formulae and developing for half the time given in the table above.

The Fixing Bath

Provide a box of Kodak Acid Fixing Powders for the fixing bath, which should be prepared as per instructions on the package. Put the powder in the large box into a tray or washbowl and when it is thoroughly dissolved add to the solution as much of the Acidifier, which you will find in a small box inside the large one, as directions call for. As soon as this has dissolved the Fixing Bath is ready for use.

Pass the film face down (the face after development, is the side on which the image appears clearly) through the fixing solution as shown in the illustration, holding one end in each hand. Do this three or four times and then place one end of the film in the tray (8 x 10 inches is a good size), still face down, and lower the strip into the solution in folds. Gently press the film where the fold occurs, not tightly enough to crease it, down into the solution a few times during the course of fixing. This insures the fixing solution reaching every part of the film. Allow the film to remain in the solution two or three minutes after it has cleared or the milky appearance has disappeared. Then remove for washing.



If preferred, negatives may be cut apart and fixed separately.

IMPORTANT—When cutting apart exposures made on Autographic Film after development, always leave the writing next to the foreground of the adjoining negative in the case of vertical pictures, or at the left hand of the negative when looked at from the reverse side, right side up, in the case of horizontal pictures.

Kodak Film must always be fixed in an acid bath. The Kodak Acid Fixing Powders are recommended or the following formula may be used if desired:

ACID HYPO FIXING BATH

Water	64 ozs.
Hypo	16 ozs.

When thoroughly dissolved, add 4 ozs. Velox Liquid Hardener, or the following hardening solution, dissolving the chemicals separately, and in the order named:

Water	5 ozs.
Sodium Sulphite (E. K. Co.)	1 oz.
Acetic Acid (28%)	3 ozs.
Powdered Alum	1 oz.

This bath may be made up at any time in advance and be used so long as it will fix films in 20 minutes and is not sufficiently discolored by developer carried into it to stain the negatives.

Washing All negatives must be thoroughly washed so as to remove every trace of hypo and other foreign substance. Where running water is accessible the films may be placed in a tray or washing box and left under a faucet from which runs a gentle stream, for about an hour. Films should be moved from time to time, so that the washing may be thorough and complete. Do not crowd too many films in too small a tray during the process. Where running water is not accessible the negatives may be placed in a tray or bowl of cold water, and left to soak for five minutes, when the water should be changed and the process repeated five or six times.

Drying Film Negatives When thoroughly washed, snap an Eastman Film Developing Clip or Kodak Junior Film Clip on each end of the strip and hang it up to dry or pin it out. Be sure, however, that it swings clear of the wall so that there will be no possibility of either side of the film coming in contact with the wall or any other object.

If the film has been cut up, pin by one corner to the edge of a shelf or hang the negatives on a stretched string by means of a bent pin, running the pin through the corner of the film to the head, then hooking it over the string.

Instructions for cutting apart Autographic Film exposures are given on page 98.



Drying with Clips

Over-development Over-development may be caused by a mistake in leaving film in the developer too long, by using the solution too warm, or by those who mix their own chemicals, in getting the developing agent too strong.

In such cases negatives are very strong and intense by transmitted light, and require a long time to print.

The remedy is to reduce by using Eastman Reducer, or by the following method:

REDUCER

First soak the negative in water for 20 minutes, then immerse in:

Water.....	8 ozs.
Hypo.....	$\frac{3}{4}$ oz.
Potassium Ferrieyanide (10% solution) poison.....	1 dram

Rock the tray gently back and forth until the negative has been reduced to the desired density, then wash it for 10 minutes in running water or in four changes of water.

Negatives may be reduced locally by applying the above solution to the dense parts with a camel's hair brush, rinsing off the reducer with clear water frequently to prevent it from running onto the parts of the negative that do not require reducing.

Should the reduced negative show any yellowness or stain it may be removed by bathing in the Acid Fixing Bath for a few minutes.

Under-development This defect is caused by removing films from the developer too soon, by using solutions too cold, or by an error in compounding the chemicals.

It is obvious that none of these defects will occur if instructions for tank development are properly followed.

The remedy for under-development is to intensify by re-development, or by the following method:

Intensification—After fixing and thorough washing, lay the film while wet, face up in an empty tray and pour over it sufficient intensifier to fully cover it; allow it to act until the film is all one even color and then pour the intensifier back into the bottle and wash the film in four or five changes of water for fifteen minutes.

Use Eastman Intensifier prepared according to instructions on the tube, or if desired the amateur may make an intensifier, using the following formula:

INTENSIFIER

1. Dissolve 60 grains Bichloride of Mercury (corrosive sublimate) poison, in 4 ozs. water
2. Dissolve 90 grains Potassium Iodide, in 2 ozs. water
3. Dissolve 120 grains Hypo, in 2 ozs. water

Each solution must be dissolved separately, then pour solution No. 1 into No. 2, and the resulting mixture into No. 3.

CAUTION: Do *not* pour solution No. 2 into No. 1, as if this should be done a red precipitate will form, which is practically impossible to remove from the film.

Intensification by Re-development While the method of intensification by re-development is comparatively new, Velox and Royal Re-developer for Sepia tones on Velox and Bromide prints is the most effective and simple means of intensifying film negatives.

Velox or Royal Re-developer may be used in exactly the same manner as for producing Sepia tones on developing papers.

Negatives intensified by re-development are built up evenly, without undue contrast and without the chance of staining.

The advantage of being able to use the chemicals for two different purposes (Sepia toning prints or intensifying negatives) is obvious, the results in either case being all that could be desired.

In re-developing negatives be sure that they have been thoroughly fixed and washed before re-developing.

A Short Cut When traveling, a glass graduate for measuring developer is more or less of a nuisance on account of its bulk and the liability of breakage. This can be dispensed with by half filling an ordinary tumbler with water (not over 70 degrees Fahr.) and dissolving the developer powders

in it. Pour this into the tank and add *cold* water to embossed ring. By previous experiment without the chemicals you can find out what proportion of lukewarm and cold water to use to get the proper temperature, 60 to 70 degrees.

The fixing bath may also be prepared without a graduate. The average tumbler holds approximately eight ounces; you can, therefore, get your fixing bath near enough to the right strength by its use. A slight variation in the strength of the solution makes no difference, provided only that you fix for five minutes after the milky appearance has disappeared from the back of negatives.

Special Graflex and Cartridge Roll Holder Film may be devel-
Directions oped in the Kodak Film Tank by following these
 directions:

All Graflex and Cartridge Roll Holder Films have a piece of gummed manila paper on the loose end of the film. To prepare the film for the Kodak Film Tank, unroll the duplex paper until the manila paper is reached. Moisten the gummed side of sticker and fasten it to the back side of the duplex paper as shown in the illustration. Again wind paper on spool. The cartridge is now ready for insertion in the Kodak Film Tank box.



Place the film cartridge in the spool carrier so that the duplex paper will draw from the bottom instead of from the top. This is exactly opposite to the way in which a Kodak film cartridge is inserted.

With the Graflex and the Roll-Holder Cartridge the "Stop" warning is not printed on the duplex paper, but instead, when about one inch of manila paper, with which the end of the film is fastened down, appears, stop turning the handle of the axle, until the end of apron is properly hooked in position and the cover of box replaced. Then proceed with the development of the film in the same manner as with a Kodak film cartridge.

THE DARK-ROOM METHOD

The first essential is the dark-room. By a dark-room is meant one that can be made entirely dark—not a ray of white light in it. Such a room can easily be secured at night almost anywhere. A comfortable working light can be used if it comes from a ruby fabric or safelight lamp. The reason a dark-room is required is that the film is extremely sensitive to *white* light, either daylight or lamplight, and would be spoiled if exposed to it even for a fraction of a second.

If possible have running water, but if this is not available provide a pitcher of cold water (ice water in summer), a shelf or table on which to work and a pair of shears.

Also provide a Developing outfit which should contain:

1 Dark-room Lamp,	Package Developer Powders,
4 Developing Trays,	1 lb. Kodak Acid Fixing Powder,
1 4-Ounce Graduate	1 Stirring Rod.

Such an outfit can be bought for a small sum and will be sufficiently elaborate for your first work.

Having provided a room or closet, where, when the door is closed, no ray of white light can be seen, set upon the table or shelf the Dark-room Lamp. The Kodak Candle Lamp, made of special, tested fabric, bound in metal frames; or, if electricity is available the Kodak Safelight Lamp, or the Brownie Safelight Lamp, which screws into an electric-light socket, offers a most satisfactory and safe illumination for the dark-room, giving a subdued red light which will not injure the film unless it is held too close to it. Set the lamp on the table at least eighteen inches from the developing tray. Never use a yellow light with Kodak Film or fog will be the result.

1. Fill one of the trays nearly full of water (first tray).
2. Open one of the developer powders, put the contents (two chemicals) into the graduate and fill it up to the 4-ounce mark with water. Stir until dissolved with the stirring rod and pour into second tray.
3. To develop, unroll the film and detach the entire strip from the duplex or tissue and red paper.
4. Pass the film *face down* (the face is the dull side) through the tray of clean, cold water (page 98), holding one end in each hand. Pass through the water several times, that there may be no bubbles remaining on the film. When it is thoroughly wet, with no air bubbles, it is ready for development.

5. Now pass the film still *face down* through the developer in the same manner as described for wetting it. Keep it constantly in motion, and in about one minute the highlights will begin to darken and you will readily be able to distinguish the unexposed sections between the negatives, and in about two minutes will be able to distinguish objects in the pictures. Complete development in the strip, giving sufficient time for development to bring out what detail you can in the thinnest negatives. There is no harm in having your negatives of different densities. This can be taken care of in the printing. The difference in density does not affect the difference in contrast.

Keep the strip which is being developed constantly in motion, allowing the developer to act for 5 to 10 minutes. The progress of development may be watched by holding the negatives up to the lamp from time to time.

Note—Proper temperature is important, and for the best results the developer should be at 65 degrees Fahr., and the fixing bath and wash water should not exceed 65 degrees Fahr. If the developer is too warm, the negatives are very liable to fog, and in many cases the emulsion will be softened and the surface will be very much more liable to injury through scratching. If the developer is too cold the chemical action is retarded, resulting in flat, weak negatives.

When developing Kodak Film, use a red lamp or a Kodak or a Brownie Safelight Lamp, taking care not to hold the film close to the lamp for more than four or five seconds at a time. This film is very rapid and is orthochromatic, therefore liable to fog unless handled very carefully.

Fog is sometimes caused by light coming in contact with the film other than that which comes through the lens during the proper exposure. Frequently it is caused by exposure to an unsafe light during development; also by light entering the dark-room through the key-hole or a crack in the door. Examine your dark-room thoroughly before developing and see that all white light is excluded. Fog is also often caused by the negative being exposed to white light after development, but before fixing, and if the negative is exposed to light before the developing solution has been washed out, a reversal of the image will frequently be found.

6. After completing development, transfer to the third tray and rinse two or three times with clean, cold water, and transfer to fixing bath. (Page 98.)

DEVELOPING KODAK FILM PACKS IN THE FILM PACK TANK

The Film Pack Tank consists of two pieces—a metal receiver or cage for the films and a tank with cover for the developing fluid. The entire outfit is self-contained and occupies very little space.

The cage of the smaller tanks is divided into twelve compartments, six in the 5 x 7 size, each accommodating one film.

Developer Powders Developing powders that have been especially prepared for use in these tanks are put up in packages of one-half dozen pairs. Each pair of powders is wrapped in a single package with instruction label.

To Prepare the Fixing Solution Dissolve a pound package of Kodak Acid Fixing Powder in 64 ounces of water. (This solution may be bottled and used repeatedly until it loses strength.)

At this point all white light must be excluded from the dark-room. If no dark-room is available, this work can be done at night in any room in which there is running water, care being taken that there is no white light in the room during the few minutes when the films are being transferred from the pack to the cage.

To Remove Films from Pack When all exposures in the film pack have been made it is light-tight, and may be taken from the camera in daylight. Provided exposed films have previously been removed, as described below, the Film Pack should be resealed immediately after removing it in daylight from the camera or adapter after the twelfth exposure has been made, by moistening the inside of the corner flaps, when they may be stuck firmly to the sides.

When ready to develop, break the black seal at the sides and pull down the bottom flap. (Fig. 1.) This gives access to the exposed film which may be removed as shown in Fig. 2.



Fig. 1

To remove one or more films for development before the entire package is exposed: Take the camera or adapter to the dark-room, remove the pack and break the black seals as above.



Fig. 2

After removing the exposed film, the pack can be replaced without sealing in the camera or adapter before leaving the dark-room and everything is ready for additional exposures.

IMPORTANT—When removing any films for development before all are exposed, do not remove papers of safety cover, but leave them to protect top film after all have been exposed and the pack removed in daylight.

To Load Films Into Cage

When all is ready load each film into its respective compartment of the cage *without detaching the black paper*. This is readily done by holding the film between the thumb and fingers with the black paper toward the hand, and doubling the edges together as shown in Fig. 3. Slide them carefully down to the bottom of each compartment, with torn edge up, and see that the center piece protrudes between the edges of the film, preventing them from coming together during the process of development.

When all the films are loaded, place cage into developing tank (Fig. 4) and raise and lower it slightly below the surface of the developer, two or three times, to expel air bubbles. Replace the cover of the tank by dropping it on and turning it to the right as far as possible.



Fig. 3
THE FILM PACK TANK.

Note—The cage of the No. 1 Tank, as compared with illustration Fig. 3, is slightly different in appearance, but the method of loading and using is exactly the same.

The white light may now be turned on and the time noted. The time may be marked on the dial which appears on the face of the container in which the developing powders come.

During development the tank should be turned end for end four or five times to secure uniform and even development. At the expiration of the necessary time, see table on page 97, the top should be removed in the dark-room or in a very subdued light and the developer poured off. When removing cover of solution cup, place cup in palm of hand so as to obtain a firm grip on bottom of cup. Then grip cover with other hand and turn slowly to left when cover will loosen readily. The tank should now be held under a tap of running water or immersed for a few seconds in a vessel of clear water. The films are then ready for fixing. Page 98.

The fixing bath should have been prepared in a tray or other vessel, the receiver taken from tank—the metal hook being intended for this purpose—and the films removed from the cage, the black papers pulled off and films placed in the bath, leaving the tank and cage available for the next pack. The films should be changed about in the bath two or three times to insure evenness of fixing.

After the films have been fixed a sufficient length of time so that all the shadows are perfectly transparent and no yellowish spots appear (it is advisable to allow them to remain in the fixing solution ten to fifteen minutes longer, in order to insure complete fixation and to avoid stains and deterioration, they should be placed in a tray under running water and washed for half an hour. Before fixing and washing be sure that the black papers are all detached. If running water is not available the films should be left in the water about three-quarters of an hour and the water changed six or eight times to remove all traces of Hypo. For drying films see page 99.

The above instructions, if carefully followed, will produce the most satisfactory results, provided anything like correct exposures have been given. We recommend the use of the Film Pack Developing Powders in these tanks, as they have been compounded from the purest chemicals for this purpose.

For those who wish to mix their own solutions, we give the following formulæ:

FOR NO. 1 FILM PACK TANK:

Sodium Sulphite (E. K. Co.).....	60 grs.
Sodium Carbonate (E. K. Co.).....	75 grs.
Pyro.....	22 grs.

FOR NO. 2 FILM PACK TANK:

Sodium Sulphite (E. K. Co.).....	120 grs.
Sodium Carbonate (E. K. Co.).....	150 grs.
Pyro.....	45 grs.



FOR NO. 3 FILM PACK TANK:

Sodium Sulphite (E. K. Co.).....	140 grs.
Sodium Carbonate (E. K. Co.).....	175 grs.
Pyro.....	52 grs.

For time and temperature follow instructions on page 97.

Dissolve the chemicals in the order given; first the sulphite in four or five ounces of water, then add the carbonate and finally the Pyro, and fill the tank to the embossed ring with cold water.

If other brands of desiccated sodas are used, a greater quantity will be required. If crystal sodas are used, about three times the quantity of carbonate and double the quantity of sulphite.

SHORT DEVELOPMENT

If it is desired to shorten the time of development, equally good results can be obtained by using two pairs of powders or twice the amount of chemicals in the above formulae, and developing for one half the time as given in the table on page 97.

Developing by the Dark-room Method After removing the exposed Films from the Pack, (see page 103) the black paper to which they will be found attached should be removed and each film placed emulsion side down in a tray of water. (The emulsion side, or face, is the dull side.) They should be allowed to stand two or three minutes and then each film should be placed separately in the developing tray, still face down. The tray should be rocked gently from time to time, the films never being allowed to mat together, and the progress of developing ascertained by holding the film up to the light of the lamp.

After completing development transfer to fixing bath. See page 98.

DEVELOPING KODAK CUT FILM IN THE KODAK DEVELOPING BOX NO. 1

The "Kodak Developing Box No. 1" is for developing, fixing and washing Kodak Cut Film, of all sizes smaller than 5 x 7. Before the box can be used, however, six or twelve "Kodak Cut Film Developing Hangers" must be secured. These can be obtained from any dealer in Kodak Supplies.

Preparing the Developer The developer that we recommend for use in the "Kodak Developing Box No. 1" is the regular 5 x 7 Eastman Plate Tank Developer Powders. Prepare the developer in the same manner as described on page 96. As there is no embossed ridge on this tank, place an empty film hanger

in position across the top edges of the box and if the water does not touch the clips, then add enough water until it comes a little above the bottom of the clips. This is to make sure that the films are entirely covered with developer.

The developer must always be mixed *fresh* and used *but once*.

DEVELOPER FORMULA

For those who wish to prepare their own developer, we suggest the use of the following formula:

Water	64 ounces
Sodium Sulphite (E. K. Co.)*	110 grains
Sodium Carbonate (E. K. Co.)*	80 "
Potassium Bromide	6 "
Potassium Metabisulphite	10 "
Pyro	60 "

Dissolve the chemicals in the order as given, and in the manner as described on page 96.

Temperature of Developer should be between 60 and 70 degrees Fahr., for the best results.

Placing Film in Hangers As the exposed films are sensitive to white light, they must be loaded into the film hangers and placed in the developing box in the dark-room.

Kodak Cut Film *Super-Speed* is considerably more rapid than the Kodak Cut Film regular emulsion, therefore use extreme caution when loading the hangers and when inspecting film during development, not to allow the light from dark-room lamp to strike the film more than a few seconds while handling it.

Now take a film hanger in the left hand and centering the film (see Fig. II), insert the edge (on the long side of film) in the jaws of one of the clips. Press firmly on the lower part of the clip so that film is held securely, then attach the other clip in the same manner.

*If other brands of desiccated Sodium Carbonate are used, a greater quantity will be required. If crystals are used, take about three times the quantity of Carbonate and double the quantity of Sulphite.



Fig. I



Fig. 11

free from dust, keeping the films apart in order to avoid all danger of scratching them.

Developing Put each film in the developing box *separately*, in rapid succession, placing the hangers so that the rods rest on the edges of the short sides of box (see Fig. 1), taking care that none of the films come in contact with sides of the box or with each other. Twelve films or less, can be developed at one time. Develop but one size of film at a time. If different sizes are developed at the same time, it will cause uneven development and streaked negatives. Keep the hangers separated.

If several films are placed in the box simultaneously they will stick together, causing development streaks, which will remain even though films are separated immediately after immersion in box.

Raise the hangers about an inch, one at a time, every two or three minutes during the time of development (keeping the films apart). This allows the developer to act evenly and adds brilliancy and snap to the negatives. When the time of development has been completed, pour out the developer and fill the box with clear cold water leaving the films in the water for about one minute, then pour out the water. Repeat this rinsing three times in order to eliminate all developer from the films, then add the previously prepared fixing bath.

Time and Temperature for Tank Development After the developer has been properly prepared, *test the temperature with a thermometer*. Best results are obtained when the temperature of the developer is between 60 and 70 degrees Fahr.

When the temperature of the developer is exactly 70 degrees Fahr., develop the film ten minutes, then for every degree colder than 70 degrees, add one minute to the time for development. For example:

CAUTION: When handling the exposed films do not place the fingers on the emulsion or dull side of the film, but hold it by the lower margin or edge.

After the film has been fastened in both clips, take hold of the bottom edge of film and pull it, to see whether the film is clasped tightly by the clips. If the film is not securely fastened and comes loose from the hanger, it will fall to bottom of box and the negative will be ruined.

Load all the films into the hangers before putting them in the developer and place them on a clean sheet of paper that is

If the developer is 65 degrees, develop the film 15 minutes; if 62 degrees, develop 18 minutes, etc.

IMPORTANT: The above rule is for the Kodak Cut Film regular emulsion; if developing Kodak Cut Film *Super-Speed*, leave the film in the developer from 10 to 15 per cent. longer.

Temperature of the developer must not exceed 70 degrees Fahr., as above that point there is danger of the emulsion loosening from its support.

It is not advisable to use very cold water as the chemicals will then dissolve too slowly and the time for development is too long for practical work.

Short Development If it is desired to shorten the length of time for development, two pairs of the powders, or double the quantity of the chemicals as given in the formula may be used. If this is done, the time for development must be one-half the time that is given in the rule for development, when one powder is used.

Fixing The fixing bath should be prepared in some separate container before starting the development of the films, in the manner described on page 98.

Make sure that the bath entirely covers the films, add more water, if necessary, to bring the level of the solution to the bottom of the clips. Raise the films several times during the fixing, in order that they be evenly fixed. Allow the films to remain in the solution four or five minutes after the milky appearance has disappeared from them; this will require about 20 minutes.

CAUTION: The "Kodak Developing Box No. 1" must not be used as a storage tank for an acid fixing bath. The bath should not be allowed to remain in it longer than is needed for fixing films; the box and hangers must be thoroughly washed after using it for this purpose.

We recommend the Kodak Acid Fixing Powder but the formulae given on page 98 may be used if desired.

Washing After pouring off the fixing solution allow the films to remain in the developing box, and place the box under a tap of running cold water. Attach a rubber tube to the faucet, long enough to carry the water to bottom of box, this insures complete circulation of water. Leave the films washing for half an hour in this manner, having a gentle current of water running in and out of the developing box. If running water cannot be had, fill the developing box with cold water and allow the films to remain for five minutes each in seven or eight changes of water. Move the films about occasionally, so that they be thoroughly and evenly washed.

Drying Hang the negatives by means of the hook on the Developing Hangers, on a stretched string. Negatives should be dried quickly, and where there is a continuous draft of air. Slow drying in a warm, close atmosphere has a tendency to destroy the even gradation secured in development.

Any sudden or great change in temperature while drying is apt to cause unequal density.

DEVELOPING DRY PLATES

The foregoing directions apply to dry plates as well as films, the chemical treatment being the same, except that the preliminary wetting may be omitted with plates.

Plates, however, must be handled in the solutions one at a time, as they would scratch each other if a larger number were put into the trays simultaneously. They should also be developed *face up*.

For fixing plates it is best to procure a fixing box, usually arranged with a set of twelve grooves. Each plate is dropped into a groove for fixing, thus eliminating the danger of scratching or over-lapping.

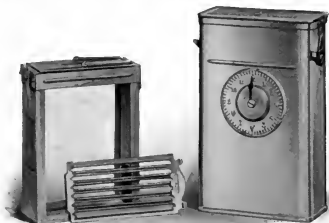
Washing In washing plates be careful that they do not overlap or touch each other, owing to the likelihood of the corners scratching the emulsions.

Note—Plates should be developed to the same density as film negatives and may be examined, while developing, before the dark-room lamp in the same manner.

After the negatives have been thoroughly washed they must be dried. Plates should be stood on edge or placed in a drying rack and kept in a cool place until dry. They are then ready for printing.

DEVELOPING PLATES WITH THE EASTMAN PLATE TANK

The Plate Tank is the same in theory as the Kodak Film Tank, with, of course, such modifications as are rendered necessary by the physical difference between plates and film. The Eastman Plate Tank consists of a metal solution cup with tightly fitting cover, a cage for holding twelve plates, or less, during development and an ingenious loading fixture for loading plates into the cage in the dark-room.



The exposed plates are loaded into the cage and placed in the tank in the dark-room, and the tank cover fastened in place. On the front of the tank is a dial for registering time. Development is allowed to continue for fifteen minutes, at 65° Fahr., the tank being reversed several times. After development the developer is washed from the plates, the cage removed from the tank in subdued light, and the plates placed in the fixing bath. (See page 98.) After fixing the plates are ready for washing in the usual manner.

The Developer We recommend the use of Pyro. The Kodak and Eastman Tank Developer Powders are prepared for use with the Eastman Plate Tank and are made from Eastman Tested Chemicals.

For the 4 x 5 Eastman Plate Tank use a "2½ and 3½-inch" Kodak Film Tank Developer Powder and for the 5 x 7 Tank, use a 5 x 7 Eastman Plate Tank Developer Powder.

For those who prefer to mix their own chemicals full instructions will be found with each Tank.

What Developer to Use for Dark-room Development Pyro is one of the most popular developers but has a tendency to stain the fingers. Should this be objected to the Eastman Special or the Eastman Hydrochinon Developer Powders may be used as they do not stain the fingers. Few amateurs own a pair of chemist's scales which are a necessity when compounding formulae. Rather than be uncertain as to correctness we advise the use of developer powders; if however the amateur desires to mix his own Pyro developer, the following stock solutions are recommended:

PYRO TRAY DEVELOPER FORMULA

A—Pyro Solution

Water	32	ozs.
Sodium Bisulphite	180	grs.
Pyro	2	ozs.

B—Soda Solution

Water	32	ozs.
Sodium Sulphite (E. K. Co.)	1½	ozs.
Sodium Carbonate (E. K. Co.)	1¼	ozs.

For use, take:

Solution A	1	part
Solution B	2	parts
Water	7	parts.

Note—The above formula is the standard 3 solution Pyro tray developer formula made into two solutions for the convenience of the amateur photographer.

*If other brands of desiccated sodium carbonate are used, a greater quantity will be required. If crystal sodas are used, take about three times the quantity of carbonate and double the quantity of sulphite.

Note—By making a comparison between the developing solution used in the developing tanks with those in use for dark-room development, sodium sulphite is in excess. The reason for this is that, owing to oxidation when exposed to the air as in dark-room development, the sodium sulphite is necessary to prevent the negative becoming too yellow. By the tank method we may use a minimum of sulphite as the negatives are not subject to this fault.

A FEW REMARKS UPON DEVELOPMENT

The foregoing pages fully cover the subject of development so far as telling the beginner exactly what to do is concerned, but a few words on the theory of development will nevertheless prove valuable.

An exposed and unexposed film do not differ so far as the eye can judge. It is necessary, therefore, to "develop" the exposed film to reveal the latent or invisible image caused by the action of light.

The chemicals of the developer are:

The action of developing agent, such as Pyro, Hydrochinon, and Hydrochinon in combination with Elon, affects the latent image by reducing to metallic silver those parts which have been affected by the light. In other words it blackens them. But these agents require the use of another substance to give them energy.

Accelerator An alkali when mixed with the active developing agent gives it a greater affinity for oxygen; it therefore becomes more energetic as a reducer. This alkali is called an accelerator. The alkalies most commonly used are Sodium Carbonate and Potassium Carbonate.

Restrainer A restrainer is a substance that has the power to restrain or retard the action of development; Potassium Bromide most commonly used for that purpose, has the property of dissolving a certain amount of Silver Bromide from the film, thereby forming a double salt which is less easily reduced by the developer. This action having taken place, the development is much slower; hence the name "restrainer."

Preservative The preservative is a substance that will keep the developer from discoloring and oxydizing when it is to be kept for future use. "Sodium Sulphite" is most commonly used for that purpose; it also has much to do with the color of the negative. If only a small portion is used the negative will be brown, the quality being harsh and hard and one that will give you a print of much contrast, while the use of a greater portion gives a gray, soft negative with more detail.

Fixing the Negative The fixing or clearing of a negative is due to the action of the "Hypo" eating out the Silver Bromide not acted upon by the light, and until this has been accomplished it is still sensitive. When the milky appearance on the back of the negative disappears it may be called "fixed," and can then be taken from the bath and exposed to any light without fear of injury.

Washing After fixing, the negative must be thoroughly washed to remove hypo or staining will result. The hypo, unless entirely removed, would also ruin the sensitive paper upon which the print is to be made, even before it would show stain on the negative.

Printing

HAVING developed the negatives the final step in the picture making is now in order—making the prints. For printing there are many papers—grouped under two general classes, “printing-out” papers, where the image is visible after printing, and “developing-out” papers which require a developing solution to make the image visible.

For the amateur there is no more satisfactory printing process than that offered by the use of Velox, which is a developing-out paper. Prints made by this process give a rich effect not excelled by any other paper.

Velox can be printed by either artificial light or daylight. Like an exposure on film the image is not visible until development.

The process is simple, but like all others, it requires some skill and judgment, both of which can easily be acquired by strict adherence to the given rules and formulae.

Velox is suitable for every class of work, as is fully demonstrated under the heading of “Surfaces and Degrees of Contrast.” Velox should not be confused with Bromide or any other paper; it has distinctive qualities of its own which have never been successfully imitated. Many improvements have recently been made in its manufacture and today Velox is the perfected product of years of experiment.

The different surfaces, grades and degrees of contrast in which it is manufactured enable the user to produce good prints from almost any negatives, suiting his tastes as well as the peculiar requirements of the negatives.

Surfaces and Degrees of Contrast Velox is made in four different surfaces on white stock and one (Royal) on buff stock and is divided broadly into three degrees of contrast, called “Contrast,” “Regular” and “Special.” As these trade terms have reference to contrast and not to surface, we could as well say “hard,” “medium” and “soft.” There will be found a variety of surfaces. Choose the surface which you prefer and the degree of contrast best adapted to each negative, remembering that “Special” should be used with negatives of average or normal density, also with strong or contrasty negatives. “Regular” is for use with flat negatives and “Contrast” with extremely flat or thin negatives.

Royal Velox is furnished in both “Special” and “Regular” but in one weight only, and differs from the other Velox papers in that it is coated on a stock having a cream tint, just a soft mellow tone that prevents harshness in the highlights. The stock is somewhat heavier than the usual Velox stock, about halfway between the single and the double weight.

Royal Velox prints are delightful when developed in the ordinary way, but to get their full value should be re-developed. (See page 125.)

The following table of grades, surfaces and degrees of contrast of Velox should be an aid to anyone using this paper:

GRADES, SURFACES AND DEGREES OF CONTRAST

GRADE	SURFACE	CONTRAST
*Velvet Velox	Semi-Gloss	Special
*Velvet Velox	Semi-Gloss	Regular
*Velvet Velox	Semi-Gloss	Contrast
*Portrait Velox	Smooth Matte	Special
Carbon Velox	Matte	Special
Carbon Velox	Matte	Regular
Carbon Velox	Matte	Contrast
*Glossy Velox	Enameled	Special
*Glossy Velox	Enameled	Regular
Glossy Velox	Enameled	Contrast
Royal Velox	Semi-Gloss	Special
Royal Velox	Semi-Gloss	Regular

Manipulation Velox prints may be successfully made, using daylight for exposure, but we strongly recommend that artificial light be used, as it is much more uniform, and it will, therefore, be easier to obtain satisfactory prints. If daylight is used, select a north window, if possible, as the light from this direction will be more uniform.

Owing to its sensitiveness, the paper should be handled in a very subdued or yellow light, otherwise it will fog. Proper precautions should be taken to pull down the window shades and darken the room sufficiently during manipulation. To test your working light, place an unexposed sheet of Special Velox, emulsion side up, on your work table in the same position that your developing tray occupies; cover one-half of it with a sheet of cardboard and let it remain there for two minutes, then develop it face down for 45 seconds. If the half of the sheet which was uncovered turns gray, or black, and the covered portion remains white, it is a positive indication that the light you are using is too strong. If, however, the entire sheet remains white, your light is safe. Never handle Velox in a light that will not stand this test. If the light is too strong for printing it should be subdued or diffused by the use of several thicknesses of white tissue paper. In the following instructions for manipulating Velox, it must be understood that artificial light will be the light used. A kerosene lamp, fitted with a round burner (known as a Rochester burner), may be used, but owing to the decidedly yellow light this gives, a considerably longer exposure will be necessary than when using a Mazda lamp.

*Furnished also in double weight Velox; double weight papers require no mount and when printed under a mask, which will insure a white margin, have a very artistic effect.

The comparative exposures using Special Velox, with an average negative using various sources of light, are as follows:

Size of Negative	Distance from Light	60-Watt Mazda	40-Watt Mazda	25-Watt Mazda	Welsbach Burner (Gas)	Average Oil Lamp
3¼ x 5½ 4 x 5 and Smaller	10 Inches	4 Seconds	6 Seconds	12 Seconds	16 Seconds	50 Seconds

Note—When using Regular Velox and Contrast, increase the exposure.

This table is only approximate, as owing to the different lights used and the varying densities of negatives, it is impossible to give an absolute rule. It serves, however, as a guide to enable the beginner to approximate the correct exposure. From this you can obtain the correct time, always being guided by the rule on page 118, as to the time of development.

The Right and Wrong Paper to Use “Special” Velox should be used when printing from an average or normal negative, also with contrasty negatives or when soft effects are desired. Regular Velox is for use with flat negatives and Contrast Velox is adapted to extremely flat negatives or when hard, contrasty prints are required.

To those familiar with Velox paper it is an easy matter to select the degree of contrast which is best suited for the results desired. The novice, however, is guided usually by the advice of others and often is misled into using a wrong degree of contrast, thereby failing to secure the results expected and is inclined to believe that the paper is at fault. It would, therefore, be advisable to keep on hand the three degrees of contrast and when in doubt as to which should be used this can be easily determined by making comparative tests with each degree of contrast.

The following illustrations will act as a guide to the best paper, Special, Regular or Contrast Velox, to be used with negatives varying as to their contrasts. The illustrations do not show a normal or average negative; the contrast between the highlights and shadows of such a negative would be between that shown in Figs. I and II. The Special Velox should be used for such negatives.

When selecting the proper paper remember that Contrast Velox is best adapted for use with the thinnest and flattest negatives.



FIG. I.

This represents a weak, thin or flat negative, one with little contrast between the highlights and shadows, and is therefore adapted to use with Regular or Contrast Velox.



FIG. II.

This represents a negative of strong contrast. This kind of negative should be printed on Special Velox.



FIG. III.

This shows the result of printing from a weak, thin or flat negative (Fig. I) on Special Velox. The wrong paper to use.



FIG. IV.

This represents a print from negative shown in Fig. II, on Regular Velox, showing very little detail in highlights. The wrong paper for a contrasty negative.



FIG. V.

This represents a print on Regular Velox from negative shown in Fig. I. The right paper for a weak, thin or flat negative. Contrast Velox is for use with very flat negatives.



FIG. VI.

This shows result of printing on Special Velox from negative shown in Fig. II. The right paper for a contrasty negative. Also suitable for the average or normal negative.

An over-exposed and over-developed negative (difficult to illustrate) is dense throughout, necessitating a very long exposure to the light in order to affect the paper. Such a negative is best printed on Regular or Contrast Velox.

Printing Requisites

The absolute necessities for making Velox prints are few in number and simple in character. Either daylight or artificial light is, of course, essential; also developing and fixing solutions and water for washing the prints.

The ordinary printing frame is used in making exposures.

Aside from suitable light and workroom, you will require:

3 trays, preferably enameled iron (a full size larger than the prints to be made.)

1 printing frame (and glass to fit, if films are to be printed).

1 4-oz. graduate.

1 bottle Nepera Solution.

1 bottle Velox Liquid Hardener.

1 lb. Crystal or Granulated Hypo.

1 package each Special, Regular and Contrast Velox.

Arrange the three trays on the work table in this order:

1 oz. Nepera Solution 4 ozs. Water See page 120 1

Clean Water 2

X Towel

4 ozs. Hypo 16 ozs. Water 1 oz. Velox Liquid Hardener 3

Do not allow the direct rays of light used for printing to strike tray No. 1, which is used for the developer. Place a piece of red or orange colored paper between the light and tray No. 1, so as to obtain a subdued and safe light. By doing so it will prevent the light fogging the paper during development.

In the center of the above spaces we have indicated the solution which each tray should contain when developing either Special, Regular or Contrast Velox. Do not be too sparing of the amount of solutions used, especially of your fixing bath (Tray No. 3); if making four or five dozen prints ($3\frac{1}{4} \times 4\frac{1}{4}$), use a full pint (see formula, page 121); and do not keep after using, as a fresh bath will give the best results.

Correct temperature is important and for the best results the developer should be 70 degrees Fahr. and the fixing bath and wash water should not exceed 65 degrees Fahr. If the developer exceeds 70 degrees the prints are liable to fog and the emulsion soften. If too cold, chemical action is retarded, resulting in flat, weak prints.

Making the Print You are now ready for an exposure and the printing frame should be filled. Place the sensitized side of the sheet of Velox against the face or dull side of the negative. The paper curls slightly, the sensitive side being concave. An absolute test is to bite the corner of the sheet; the sensitive side will adhere to the teeth.

Place the printing frame the correct distance from the artificial light used, holding the frame away from the light a distance equal to the diagonal of the negative. To prove that the light is evenly diffused at the point selected for exposure, take a piece of white cardboard, the size of the negative, and move its position with reference to the light, until you find the shortest distance at which an even illumination is secured. A few seconds exposure will be required when printing an average negative on Velox. We would suggest before making the first exposure, the cutting of a piece of Velox paper into strips about an inch wide, and placing one of them over an important part of the negative, make the exposure, using your best judgment as to the distance from the light and the time of printing. Develop it and if not satisfied try another strip, varying the time as indicated by the first result. When the desired effect is secured, you can make any number of prints from the same negative, and if the time of exposure, distance from light as well as the time of developing are the same as for the satisfactory test print, all the succeeding prints will be equally good. By comparing your other negatives with the one you have tested you will be able to make a fairly accurate estimate of the exposure required for any negative.

After taking the exposed piece of paper from the printing frame, in a safe place previously selected, it is ready for development. The *dry print* should be immersed face up in the developer (Tray No. 1) and quickly and evenly covered with the solution. *Special, Regular and Contrast Velox should be exposed so as to develop to the proper depth in about forty-five seconds.* As soon as the image has reached the desired depth remove from the developer to the second tray and rinse for a moment, turning the print once or twice, then place it in the acid fixing bath (Tray No. 3), *keeping the print moving for a few seconds, the same as was done when rinsing; move prints about occasionally so as to give even and thorough fixing, preventing stains and other troubles.* Leave the prints in this solution until thoroughly fixed; this will take

about fifteen minutes. When fixed remove from fixing bath and wash thoroughly for about an hour in running water, then dry. If running water is not available, then the prints may be placed in a tray or washbowl of cold water, and left for five minutes each, in ten or twelve changes of water. Move the prints about occasionally to ensure the water acting evenly on the surface of the prints, and to make sure that the hypo is entirely eliminated. After drying, prints may be trimmed and mounted.

Be systematic in working, remember that cleanliness is essential in photography. Care should be taken to prevent the hypo in any way getting into the tray containing the developer. Have a clean towel when beginning work and rinse and wipe the hands each time after handling prints in hypo solution.

**Notes on
Develop-
ment**

Velox requires a special developer and should not be used with one made for plate and film development only. Nepera Solution, however, is a universal developer —see page 120. Various developing agents are used in the production of Velox prints and are marketed under

different trade names. It has been proven, however, that Elon and Hydrochinon in combination yield the very best results on Velox when used in the proportion given in our formula. Owing to the difficulty many have in securing absolutely pure chemicals and the trouble and subsequent loss of material to those attempting to compound their own developers, we recommend the use of our liquid developers Nepera Solution and Velox Liquid Developer, for Velox papers. To those who prefer to prepare their own solution, we recommend the following formula:

M. Q. DEVELOPER
(Elon-Hydrochinon)

Hot Water (about 125°)	8 ozs.
Elon	22 grs.
Sodium Sulphite (E. K. Co.)	¾ oz.
Hydrochinon	65 grs.
Sodium Carbonate (E. K. Co.)	1¼ ozs.
Potassium Bromide	7 grs.
Water to make	16 ozs.

This solution will keep indefinitely if placed in bottles filled to the neck and tightly corked. It should be used, diluted with equal parts of water, for the "Special" "Regular" and "Contrast" papers.

Note—If other brands of desiccated Sodium Carbonate are used a greater quantity will be required. If crystals are used, take about double the quantity of Carbonate and double the quantity of Sulphite.

It is important that the temperature of the developing solution should be 70 degrees Fahr. In summer, if found necessary to cool the developer, do not place ice *in* the solution, as it will dilute it. Place the tray containing developer into one of larger size, with ice around it.

Nepera Solution This is known as the "universal" developer because it may be used not only for Velox, but Azo, bromide paper, films or plates. Like all Nepera liquids, it is a concentrated solution with the combination of purest chemicals which will give the best results. When used in combination with Nepera Auxiliary Powders, it is excellent for films or plates, giving negatives of the quality best suited for developing-out paper.

For Special, Regular or Contrast Velox use:

Nepera Solution	1 oz.
Water	4 ozs.

Develop for about 45 seconds.

The temperature of the bath should be 70 degrees Fahr.

Velox Liquid Developer This is an excellent ready-to-use concentrated developer for Velox papers. Unlike any other developer, it has certain qualities which make it different in its action, as it gives a guide to indicate when the print is thoroughly fixed.

When using this developer the print turns a canary yellow, and this color does not disappear until the print is completely fixed. Fifteen minutes in the acid fixing bath will remove this color, provided the bath is of proper strength.

If the yellow color remains, it indicates that the print is not fixed and it should be returned and allowed to remain longer in the fixing bath, or transferred to a bath of proper strength until the yellow color entirely disappears.

This developer has a tendency to produce soft effects on Velox papers.

For Special, Regular or Contrast Velox use:

Velox Liquid Developer	1 oz.
Water	4 ozs.

The temperature of the bath should be 70 degrees Fahr.

VELOX LIQUID DEVELOPER MUST NOT BE USED FOR DEVELOPING FILMS, PLATES OR BROMIDE PAPERS, NOR FOR VELOX PAPER WHEN IT IS TO BE RE-DEVELOPED TO THE SEPIA TONE.

Fixing Hypo may be obtained for use in either a granulated or crystal form. Its purpose is to dissolve the silver salts which have not been acted upon by light. The importance of the chemical is evident, but it is probable that no part or process of photography is more abused than that of correctly preparing a fixing bath and properly fixing prints. To secure permanency, prints *must* be fixed in a fresh acid fixing bath. When hypo is first dissolved in water, the temperature of the solution is materially reduced. *It is important that the temperature of a fixing bath should not exceed 65*

degrees Fahr. Probably more prints change color from insufficient fixing than lack of washing, so these points should be given attention. Have plenty of solution. *Always use the acid hardener in the bath as it will overcome the tendency of the fixing bath to cause blisters and stains, and move the prints about for the first few seconds after immersion to stop the action of the developer at once over the entire surface of the print.*

Move the prints about occasionally during the time of fixing, to avoid stains and other troubles.

Kodak Acid Fixing Powder Kodak Acid Fixing Powder is supplied in packages of different sizes, which contain all the chemicals necessary to prepare a correct acid fixing bath. We recommend its use as it is the most convenient and easy to prepare.

Directions for preparing are given on each package.

If the amateur prefers to mix his own fixing bath, the following formula is recommended.

Our formula for preparing the Acid Hypo fixing bath is as follows:

Water	64 ozs.
Hypo (crystal or granulated)	16 ozs.

When thoroughly dissolved, add the following hardening solution, dissolving the chemicals separately and in the order named:

Water	5 ozs.
Sodium Sulphite (E. K. Co.)	1 oz.
Acetic Acid (containing 28 per cent. pure acid)	3 ozs.
Powdered Alum	1 oz.

This solution will keep if placed in tightly corked bottles, and one pint of it will fix one-half gross of 3¼ x 5½ prints or their equivalent. If Sodium Sulphite in crystal form is substituted for desiccated, double the quantity mentioned should be used.

Amateurs will find it advisable to use our prepared solutions, and the concentrated Velox Liquid Hardener is especially recommended:

Water	16 ozs.
Hypo	4 ozs.
Velox Liquid Hardener	1 oz.

When fixing Kodak Velvet Green prints, double the quantity of water used in the two preceding formulae.*

Notes on Washing The finished prints must be entirely free from hypo. To wash a batch of prints, using two trays of suitable size and transferring each print separately from one tray to the other, changing the water at least twelve times, will take a full hour for the process. In running water,

*To those who wish to purchase the Developer and Acid Fixing Bath in dry form, we recommend our tube developers for Velox and Kodak Acid Fixing Powders.

where the prints can be kept constantly moving so that each individual print has a thorough washing, from one-half to one hour, according to the number of prints, will be required. Prints will not wash if piled in a heap in a tray and the water simply runs in at one end of the tray and out at the other. In some localities where there is an excessive amount of iron or impurity in the water, the whites in the prints may have a slight yellowish tone or small red spots may appear. These can be prevented by filtering the water used through several thicknesses of muslin or one thickness of canton flannel. Prints need not be washed any longer than is necessary to completely free them from hypo. The temperature of the water in winter should be kept as uniform as possible, as ice-cold water will cause blistering. When running water is used for washing, the stream should not be allowed to fall directly on the prints as it will cause breaks in the fiber of the paper, producing blisters. Place a tumbler or graduate in the washing tray and allow the water to run into it and overflow into the tray.

Test for Hypo To determine when the print is thoroughly free from hypo, the following test formula may be successfully employed:

Potassium Permanganate	8 grs.
Water (distilled)	8 ozs.

This solution should be made up fresh at least once a month.

Fill a graduate with pure water and add three or four drops of the permanganate solution. Then take a couple of prints from the wash-water and allow the water from the prints to drip into the graduate. If hypo is present, the violet color of the water will change to a slight greenish tint in from five to seven minutes. In such case throw out the permanganate and return prints to the wash-water to remain until similar tests show that the hypo has been entirely eliminated, which is indicated by the solution in the glass remaining a violet color.

Drying After prints have been thoroughly washed, remove from the wash-water and place on a clean glass in a pile face down and press out superfluous water. Then lay out separately, face down on cheesecloth stretchers. These may be constructed by making a framework of light wood and tacking unbleached cheesecloth tightly over it. Prints dried in this manner will curl very slightly.

If stretchers are not used, dry the prints face down on clean, uncolored cloth, or towels, which are free from lint.

Never dry Velox prints *between* blotters or on papers. They are likely to stick and cause much annoyance.

Enameled Surface Paper Glossy Velox (not Matte or Semi-Gloss) prints can be burnished or squeegeed. Take prints from the wash-water and place face down on a ferrotype tin, squeegee into absolute contact and allow to become bone dry, when they will peel off with the desired luster. If the tin has been in use for some time, portions of prints may stick; to prevent this, prepare the tins in the following manner:

Dissolve ten grains of paraffin in one ounce of benzine. The solution should be used for polishing the tins, applying to the surface of the ferrotype plate with a soft cloth (canton flannel). When the surface of the tin has been thoroughly covered with this preparation it should be polished with a piece of dry canton flannel to remove as much of the paraffin as possible.

Clean the tins occasionally with hot water, in order to remove any particles of gelatine which may remain on them from former prints.

The simplest and most satisfactory way to mount **Mounting** prints is by using Kodak Dry Mounting Tissue, as by this process the prints are mounted in absolute contact and will not curl even on thin mounts.

Kodak Dry Mounting Tissue is dry and not sticky to handle, mounting is accomplished quickly and no time is lost waiting for prints to dry after mounting. Two prints may be mounted back to back, and being free from curl can then be used as an album leaf. Any print may be mounted with the tissue and, as it is water proof, there is no possibility of the print becoming stained from any chemical in the mount stock.

To use the tissue, lay a print on its face and tack to the back of it a piece of tissue of the same size or a little larger than the print, by applying the point of a hot iron to small spots at opposite ends. Turn the print face up and trim print and tissue to desired size. Place in proper position on mount, cover the print with a piece of smooth, unprinted paper and press the whole surface with a hot flatiron. *Press don't rub.* The iron should be just hot enough to siss when touched with a wet finger. If the iron is too hot, the tissue will stick to the mount and not to the print; if too cold, the tissue will stick to the print and not to the mount. Remedy—Lower or raise the temperature of the iron and apply again.

For mounting with paste the following plan is best:

Prints should be trimmed to size desired before mounting. They should be dry and perfectly flat for trimming, and a trimming board used instead of a knife and ruler, for with the board absolutely true edges may be obtained.

After the prints are trimmed, immerse them in a tray of clean water, allowing them to soak long enough to become thoroughly limp. Remove to a good sized piece of clean glass, placing them in a pile face down. Cover with a piece of clean blotting paper and with a print roller or a squeegee, press all the superfluous water from the pile. Then with a good bristle paste brush apply a thin, even coating of Kodak or Eastman Photo Paste. Raise the print by taking hold of the two opposite corners and turning it over, place in position on the mount. Lay a clean, dry blotter over the print and with the roller press into contact. Any lint or fuzz from the blotter, or any paste on the surface of the print should be immediately removed with a soft sponge or damp cloth. Any imperfections in the finished print may be corrected by spotting, using a fine sable brush and Eastman Spotting Colors.

Select mounts which harmonize with the tone of the print. If Sepia prints are to be mounted, any shade of brown or some of the deeper reds may be used, but these same mounts would not be suitable for black and white tones. For the black and white prints any shade of gray, carbon black, buff or cream color may be successfully used.

**Finishing
Velox
Post Cards**

The process of making prints on Velox Post Cards is identically the same as that for making Velox Prints. The cards are sensitized on one side only and the reverse side is printed to conform with the U. S. Postal regulations.

**Double
Printing**

Effective and artistic work may be done on Velox Post Cards by double printing. By this process gray borders and ground may be produced. The work requires careful and exact cutting of the necessary opaque masks and accurate registry of the cards when printing. Provide a number of pieces of clear glass, cut to size 5 x 7 (old negatives from which the emulsion has been thoroughly cleaned by soaking in a solution of hot water and sal-soda are suitable), also a few sheets of opaque paper the same size (5 x 7). From one of these sheets make a mask as shown in Fig. 1.

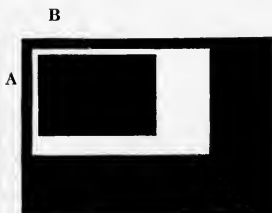
Measure from edges A and B a space five-eighths of an inch wide, then cut an opening 2 x 3 inches through which your negative and cards are to be exposed. Fasten the negative with strips of adhesive paper to one of the pieces of clear glass, placing that portion to be printed directly in under the opening in the mask. Adjust glass, negative and mask in printing frame, lay on the Velox Post Card, sensitized side down, so that one end covers the opening in the mask. Be careful to have the edges A and B of glass, mask and card fit flush against the corresponding sides of the printing frame. Expose to printing light, giving correct time required for a perfect print, remove the entire outfit from the printing frame and insert glass and mask No. 2, which you will have previously prepared as shown in Fig. 2.

No. 1

No. 2



Shaded portion represents opaque paper. White portion shows part cut out.



Shaded portion represents opaque paper. White portion shows part cut out.

To prepare mask No. 2 From another piece of opaque paper 5 x 7, cut an opening 3 x 5 inches and measure exact so as to leave margins of one-quarter inch on the sides A and B. Gum this mask securely to another glass, then cut a piece of opaque paper $2\frac{1}{4}$ x $3\frac{1}{4}$ inches and gum this in a clear space at a distance of exactly half an inch from edges A and B. Place this entire outfit in printing frame, lay on Velox Post Card, previously exposed under No. 1 mask, fit edges flush into corner of the frame and expose. This second exposure should be just enough to produce the desired tint, governing time by degree of contrast of Velox used. If the exposure has been too great the border will be dark, if under-exposed, the border tint will be light. A little practice may be necessary in order to secure the tint desired.

Now, if you have made all measurements accurately and exposure and development have been correct, you will have on a finished post card your picture 2 x 3 inches in size, surrounded by a narrow white margin one-eighth of an inch wide and a gray border one-quarter of an inch wide on top and one side, and one-half inch wide at bottom and one and one-half inch on other side. The tint of this border should be a slate gray and should harmonize with the black tone of your print.

Other forms, such as ovals and circles, may be made and the process for their making is the same as already described.

Sepia Tones on Velox There are occasions when it is desirable to modify the tone of Velox prints, in order to secure some effect more in keeping with the subject than the original color produced by development only. The Sepia Tone is permanent and may be secured as follows: The Velox Re-development process will give the best results yielding pleasing and permanent tones. Prints on any grade or surface of Velox give most pleasing tones when re-developed, but re-development is, perhaps, specially advantageous for prints on Royal Velox, as the process brings out and accentuates the full value of the soft, creamy stock upon which Royal Velox is coated, the finished prints possessing an almost indescribable softness and delicacy.

Velox prints of any surface which have been evenly and thoroughly fixed and washed will give desirable results with the Re-developer, but some subjects, such as marines and snow scenes, are best rendered in black and white. Landscapes, autumn scenes and portraits are given greater artistic values by the warmth of tone which the Re-developer produces.

A package of Velox Re-developer consists of bleaching powders and a bottle of re-developing solution. Each powder contains chemicals which require only the addition of a certain quantity of water to make a bleaching bath for the reduction of the print before re-development. The liquid contained in the bottle is highly concentrated and should be used carefully, the entire contents of a 4-oz. bottle being sufficient to re-develop about four hundred $3\frac{1}{4}$ x $5\frac{1}{2}$ Velox prints or post cards or their equivalent. It is important that the prints should have been thoroughly washed so that no trace of hypo remains. In order to

obtain the best results it would be advisable to have the prints dry before developing. Prepare the bleaching bath and re-developing solution according to the instructions given on the package. Place the black and white print in the bleaching solution, let it remain until all trace of black has disappeared from the shadows, about one minute; it should then be removed and rinsed thoroughly in fresh water and placed in the re-developing solution, where the faint image immediately changes to a warm, brown tone, gradually deepening until all its former brilliancy returns, but in a sepia tone instead of black and white. This requires fully thirty seconds. Too strong a solution of Re-developer or too long immersion in this solution will cause blisters. After re-development rinse the prints, and immerse them in a hardening bath composed of Velox Liquid Hardener, 1 ounce; water, 16 ounces—leave the prints in this solution for about five minutes. A final washing of about fifteen minutes is then given the prints.

Velox Re-developer will also produce excellent sepia tones on any bromide or other paper that is intended to be printed by artificial light, the age of the print does not, seemingly, make any difference in the tones obtainable. The best results are obtainable from prints which have a good bluish-black tone, rather than a green or olive tone, such as is produced by the use of too much bromide. Both the bleaching and the re-developing baths will retain their strength for some time if kept in well stoppered bottles. If the prints show a tendency to blister, it doubtless comes from insufficient hardening of the black and white prints. Remedy—use a fresh and absolutely correct acid fixing bath at a temperature not exceeding 65 degrees, fixing the prints at least 15 minutes, then wash the prints thoroughly.

A careful study of these instructions will enable you to produce satisfactory results on any surface of Velox paper.

Causes of Non-success By consulting the following causes of failure you will probably be able to locate any trouble you may have.

PRINTS ARE TOO BLACK.

- Over-exposure.
- Over-development.
- Negative too weak or thin.
- Perhaps the wrong degree of contrast of paper was used; try Regular Velox or Contrast.

PRINTS ARE TOO LIGHT, LACK DETAIL.

- Under-exposure or under-development; try Special Velox.

GRAYISH WHITES THROUGHOUT ENTIRE PRINT.

- Chemical or light fog, test the light (see page 114.)
- Insufficient Potassium Bromide in developer.
- Too long development.
- Old paper.

GRAYISH MOTTLED OR GRANULATED APPEARANCE OF EDGES OR ENTIRE PRINT.

- Under-exposure, forced development.
- Old paper.
- Moisture, paper kept in damp place.
- Chemical fumes, Ammonia, Gas, etc.

GREENISH OR BROWNISH TONES, SOMETIMES MOTTLED

Developer exhausted, badly discolored, or too cold.
Excess of Potassium Bromide.
Over-exposure.

BROWN OR RED STAINS.

Exhausted or oxidized developer. (Never use developer after it is much discolored or when too warm.)
Fixing bath lacks sufficient acid (sometimes milky) and prints were not moved occasionally to allow even fixing. (See page 121.)

PURPLE DISCOLORATION (Not Frequent.)

Prints not moved occasionally during fixing.

ROUND WHITE SPOTS.

Air-bells on the surface of paper.
*To avoid, be sure to develop prints face up, immediately brushing off any air-bells that may form. Use sufficient developer to thoroughly cover the prints.

ROUND OR IRREGULAR DARK SPOTS.

Caused by air-bells forming on the surface of print when several are allowed to become matted together in fixing bath, and failing to move prints about occasionally during fixing.

WHITE DEPOSITS ALL OVER SURFACE OF PRINT.

Milky Hypo bath. (Incorrectly mixed or impure chemicals used.)

BLISTERS.

Prints have been creased or broken while washing.
Do not allow water from the tap to fall directly on the prints.
Too great difference between temperature of solution and wash-water.
Fixing bath lacks sufficient hardener.
Never use a plain Hypo Fixing bath; always acidify. (See page 121.)

BLISTERS OCCURRING DURING RE-DEVELOPMENT.

(See page 126.)

YELLOWISH WHITES WHEN OTHER THAN VELOX RE-DEVELOPER HAS BEEN USED.

Stain all over print is result of under-exposure and forcing development.

Prints not kept moving for the first few seconds after immersion in the hypo fixing bath.

Too weak a developer.

Insufficient fixing and washing.

Iron in wash-water—may come from rust in water pipes.

FREAKS.

Picture develops irregularly and appears to be covered with greasy streaks and finger marks and gives the impression that there are spots on the paper which have never been coated. Of all complaints received regarding Velox paper, none are caused by any condition more annoying than this "freak" trouble. It is annoying to the photographer because he feels sure the fault is in the paper, and annoying to us because we know that the fault lies in incorrect solutions. The illustration below gives



Developed in Elon-Hydrochinon half as strong as that advised in instruction sheet.



Developed in Elon-Hydrochinon strength as advised in instruction sheet.

some idea of this curious effect. It is in warm weather when the humidity is great that these "freaks" most frequently occur.

Undoubtedly the paper absorbs moisture unevenly and in certain spots becomes repellant to the action of an incorrect developer. In making up a developing solution it is absolutely essential that pure chemicals be used, and as Velox requires a bath that contains about one-third more Sodium Carbonate than Sodium Sulphite, it is easy to see that any mistake made in the proportion of either chemical would be apt to cause trouble. The remedy for "freaks" is to throw out your developer and mix a fresh solution, and if necessary, use it stronger.

It sometimes happens that one package of Velox will freak in a certain developer while another will not. This is not proof that the paper is defective, but simply shows that one package has been kept under different conditions from the other at some time since it left our factory, and because of this is more susceptible to the action of an incorrect developer. Both packages, however, will give good results if the solution used is absolutely correct. When conditions are extremely unfavorable it may be advisable to use a more concentrated solution or less

water and a slightly increased amount of Sodium Carbonate than specified in the formula regularly recommended.

The temperature of the developer is also important. A solution that is too cold will produce failures more readily than when it is used at the normal degree.

Sea air will affect Velox, causing yellow whites, so packages should not be left open and prints should be developed immediately after exposure.

Permanency The permanency of Velox prints has never been questioned. Permanency of any Velox print depends upon the thoroughness of manipulation. It is beyond question that with correct developer freshly prepared and with thorough fixing and washing, Velox prints will be absolutely permanent. Many dealers have perfect sample prints that were sent to them years ago and have exposed them continually to every conceivable atmospheric condition. That they are still being used as samples is an unanswerable argument in favor of Velox permanency.

KODAK VELVET GREEN

Kodak Velvet Green is a developing-out paper and like Velox the image is invisible after exposure to light, until a developing solution has been applied.

The natural color of Kodak Velvet Green is a rich, true green, secured by the use of a one-solution developer.

As much of the beauty of a photographic print depends upon the color or tone in which it is rendered, a paper such as Kodak Velvet Green will be especially appreciated for marine and landscape subjects. Its use gives pleasant relief from the cold tones of the ordinary black and white print and affords every opportunity for the production of permanent prints of delightful tone and quality by a very easy and simple process.

Kodak Velvet Green is made in one surface (semi-gloss) and one printing speed, and two weights of paper stock, single and double; also on post cards. Although the paper is sensitive to white light and should be properly protected when handled, exposure of prints should be made to daylight rather than to artificial light.

With a negative of average density, the exposure by daylight (not sunlight) will be from 10 to 30 seconds; a full development is recommended to produce the full brilliancy of color and quality.

By comparing your other negatives with the ones you have tested, you will be able to make a fairly accurate estimate of exposure required by any negative.

DEVELOPING SOLUTION FOR KODAK VELVET GREEN

Nepera Solution	1 oz.
Water	4 ozs.

After taking the exposed piece of paper from the printing frame, in a safe place previously selected, it is ready for development. The *dry* print should be immersed face up in the developer and quickly and evenly covered with the solution.

If the time of exposure and the temperature of the solution are correct, the print should fully develop in 45 seconds, *although a somewhat longer immersion may be necessary* and not harmful. Full development of prints on Kodak Velvet Green is the one important feature in connection with their manipulation, for on this depends the final tone. In case of over-exposure and under-development prints will assume a yellowish-green color, which is objectionable. The true green tone, the feature of this paper, will be obtained by careful attention to exposure and development of prints.

As soon as the image has reached the desired depth remove from the developer to tray and rinse for a moment, turning the print several times, then place it in the acid fixing bath. Kodak Velvet Green prints may be fixed, washed and mounted similarly to Velox. (See

pages 113-129.) The fixing solution should be made up, one-half the strength of that used for Velox. To those who prefer to prepare their own solutions we advise the use of the Elon-Hydrochinon formula on page 119.

The Kodak Amateur Printer The Kodak Amateur Printer offers the maximum of printing efficiency when used in connection with Velox or any developing-out paper.

The Printer consists of a box with a removable top, and in it a glass window through which the printing is done. Prints may be made with white margins, any size from $1\frac{5}{8} \times 2\frac{1}{2}$ to $4 \times 5\frac{1}{2}$ inches, by a simple automatic masking device, which holds the negatives firmly until released. Within the box is a small red electric bulb to permit the adjustment of negative and paper, and provision is made for a 60-Watt Mazda lamp, which is automatically turned on when the hinged frame is closed to make the exposure. At the side of the box is a window covered with orange fabric which serves as a dark-room lamp when the red light is turned on and provides, with the Mazda lamp, a safe light for Velox developing.



To operate the Kodak Amateur Printer it is necessary that electricity be available.

Kodak Auto-mask Printing Frame The Auto-mask is the most convenient and useful thing in printing frames that has yet been produced. It is adaptable to the printing of negatives of any amateur size from 4×5 , $3\frac{1}{4} \times 5\frac{1}{2}$ and smaller, using the same simple masking device employed on the Kodak Amateur Printer. The negative is held firmly in place by the mask and is readily released, when desired, by a slight pressure on the thumb lever.



Any number of uniformly masked prints may be made without changing the position of the negative, and if desired, prints may be so made that white space is left at the side or bottom for writing as, for example, with post cards. The graduated scales attached to the stationary guides, aid in sizing and holding exact dimensions of the mask openings. Can be used with oil, gas, electric or daylight.

Clouds in the Picture

The Printing-in Method

Before attempting to add clouds to your landscapes by the printing-in process, it would be well to obtain a collection of cloud negatives in order that you may be able to select one that will fit each case, for it must be remembered that the clouded sky needed in each instance depends almost entirely upon the conditions existing at the time the landscape negative was obtained. For instance, should you picture a landscape when the sun is directly back of the camera and then print in from a negative, the clouds of which have received their illumination from immediately in front of the instrument, you can readily imagine the result, due to cross lights throughout the picture.

Then again, if the landscape is illuminated from the left, see that the clouds in the negative used are illuminated from the same point. Do not combine clouds taken on a sunless, gloomy day with a landscape taken when illuminated by the direct rays of the sun or vice versa.

Cloud negatives that are to be used for printing-in should be thin. They should, however, have sufficient strength to give brilliancy to the print. There are several advantages in using a cloud negative which is more or less transparent, as you can see through it and better judge as to its adjustment over the print to which you propose to add the clouds.

The Negative

When obtaining negatives for printing-in, it is necessary to make very short exposures, because if we over-expose, even very slightly, we destroy the delicate contrasts that exist between the high-lights and shadows and thereby flatten the negative. For instance, if we make an exposure of $\frac{1}{50}$ of a second with stop U. S. 8 for an ordinary landscape fully illuminated by the direct rays of the sun, we in most cases properly time the foreground but over-time the sky, destroying its beauty, and for that reason, when exposing for the sky alone $\frac{1}{50}$ or even $\frac{1}{100}$ of a second with stop U. S. 32 will, in most cases, give perfect detail.

An exposure thus obtained should be carefully developed, too much contrast avoided and development stopped the moment that full detail appears. You will then have a negative that will print rapidly and give you all the gradations of light and shade that were impressed upon the eye at the time the exposure was made. It would be well to add that if a Kodak Color Filter is used, it will improve your negative somewhat but will increase the length of the exposure required.

The Process

In the first place, it is necessary, when printing the foreground, to obtain a white sky. In order to do so you must mask that portion of the negative in order that the light may not penetrate the film and affect that part of the print underneath it. First, take a sheet of thin strawboard and roughly sketch across its surface (about midway between the top and bottom) a mark to correspond as nearly as possible with the sky line of your

negative; then cut your board along this line. Save both halves because you will need them later. Now procure a printing frame (containing a sheet of glass) somewhat larger than the negative you are to print from, and after locating the negative in the proper position, fasten it to the glass with small stickers, then tack the upper half of the cardboard to the face of the frame so that only that portion of the negative which you wish to print from will show. Cover the entire face of the frame with tissue paper and make your print.

Now place your cloud negative in the printing frame and properly locate the print over it, using the lower half of the cardboard to cover up the foreground so that the light will reach the sky only. It should be borne in mind that the cardboard (which we will call a mask or vignetter) when tacked on the frame should be raised up from the glass about one-quarter of an inch, so that when printing the light will diffuse and not produce a sharp line on your print. When using Velox, as the image does not show before development, it will be necessary to mark the paper at the edge in order to tell just where the sky line comes; otherwise you will be unable to properly locate your cloud negative. When using developing papers it would be well to paste two or three thicknesses of tissue paper over your frame.

Easy Methods of Making Enlargements

MOST amateurs are aware that beautiful enlargements of almost any size can be made from Kodak or any small negatives, but seem to think that the process of enlarging is difficult and requires a great deal of apparatus and technical skill. As a matter of fact the making of an enlargement is very simple and requires only a moderate outfit for apparatus.

In the following pages we clearly describe the characteristics and uses of Bromide papers and demonstrate how enlargements are made with simple and inexpensive apparatus. No attempt is made to describe the more intricate and costly apparatus demanded by the professional, but we confine ourselves to the demands of the average amateur.

The Kodak Auto-Focus Enlarger Offers a simple means for making bromide enlargements. An automatic focusing device is a part of the Enlarger itself. By the elimination of the necessity of focusing, the method of enlarging is reduced to an easy printing process, almost as rapid as contact printing.

The construction of the Kodak Auto-Focus Enlarger is exceedingly simple. After the Enlarger is set up, ready for use, there is but one adjustment necessary, it is to merely slide the camera up or down on the standard; this makes the image larger or smaller as desired. The Enlarger is *always* in focus. When the size of the enlargement desired is obtained, the camera is then automatically in the exact focus, no further adjustment being necessary.

The Kodak Auto-Focus Enlarger equipment includes everything necessary except the electric lamp for making enlargements from all negatives 4 x 6 inches or smaller. A lamp of the proper voltage (60 watt) can be obtained from any local dealer in electrical supplies.

Most amateurs are under the impression that the process of making an enlargement is intricate and requires a great deal of apparatus and technical skill. As a matter of fact, the making of an enlargement with the Kodak Auto-Focus Enlarger is very simple and easy.

In the following pages we clearly describe the characteristics and uses of Bromide paper, and explain how to use the Kodak Auto-Focus Enlarger. We also describe the method of using the Kodak Enlarging Outfit and the Brownie and Vest Pocket Kodak Enlarging Cameras.

Bromide Paper Bromide paper is a pure photographic paper coated with a sensitive compound, composed principally of bromide of silver and white gelatine and similar to the emulsion of the ordinary film or dry plate, but of much less rapidity, permitting manipulation in a stronger light than would be safe for films or plates.

Bromide of silver gives a pure black tone after it is exposed to light and developed, the unexposed portions of the paper coated with this emulsion remaining perfectly white except with Royal Bromide paper, which is coated on a delicate cream stock.

If the beginner will consider the sheet of Bromide paper as practically the same as a slow film or dry plate, and that a positive image is produced by printing through a negative on to the sheet of Bromide paper with the negative and sheet of paper some distance apart instead of in contact, as in making an ordinary print, a clearer understanding of the process will be obtained.

Bromide paper has remarkable keeping qualities, and the developed print, when carefully fixed and washed, is as permanent as the paper support itself.

What is an Enlargement

An enlargement, in the usual sense, is a positive image or picture obtained by permitting rays of light to pass through a negative, then through a lens and focused on a sheet of sensitive Bromide paper. The size of the projected image depends upon the distance between lens and paper—the further the lens is from the paper the greater the enlargement, which will be readily understood by reference to Fig. 1.

An enlarged negative can also be made in the same manner by using a small positive in place of the negative, and projecting the image on a cut film or dry plate, instead of on Bromide paper.

Operating the Kodak Auto-Focus Enlarger

The standard and camera should be clamped on the edge of some steady, firm support, such as a table or shelf, following the instructions given in the manual that accompanies the Enlarger.

The Enlarger when set up, will be in position, ready for use, as shown in Fig. 2.

Provide a 60-watt straight side Mazda electric light bulb (this is not furnished with the Enlarger), and place it in the reflector or lamp-house according to the directions in the manual, then screw the plug on end of connecting cord into electric light socket and turn on the current.

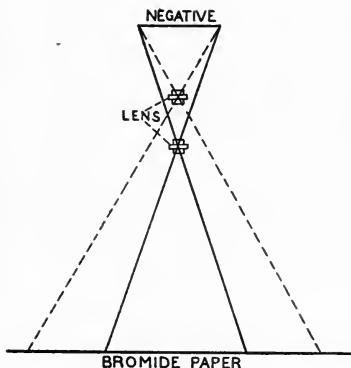


Fig. 1



Fig. 2

This illustration shows the Kodak Auto-Focus Enlarger set up and ready for use, including the two steel bars in proper position for holding the paper.

This Enlarger must be operated in a dark-room, as otherwise the Bromide paper will be fogged. By a dark-room is meant one that can be made entirely dark—no white light must enter the room. Such a room can easily be secured at night almost anywhere. The most convenient light to use in the dark-room is the Brownie or the Kodak Safelight Lamp. The series 0 Safelight in either of the above lamps will produce a bright orange light which is suitable and perfectly safe for use with Bromide paper.

To place the negative from which you wish to make the enlargement in position, remove the negative holder (located between the back of bellows and the reflector or lamp-house), then remove the top sheet of glass from the negative holder and place the negative on the bottom sheet of glass, face or dull side down. If the negative from which the enlargement is to be made is smaller than 4 x 6 inches, place the flexible

metal opaque mask of the proper size (six sizes are included with the Enlarger) over the negative, and adjust the negative to the correct position by moving it to the right, left, up or down, so that the transparent margin of the negative will not appear in the opening of the mask; then replace the top sheet of glass, fastening it in place by means of the spring fingers at each side of the negative holder. After the negative is in proper position, replace the negative holder in camera with the face or dull side of the negative down, or towards the lens of the camera.

The Kodak Auto-Focus Enlarger will make enlargements from all of the popular sizes of film and glass negatives, and from all negatives that are not larger than 4 x 6 inches.

When enlarging from negatives that are smaller than 4 x 6 inches, it will be necessary to use an opaque mask, so as to cut out all light other than that which passes directly through the image or picture area of the negative. Unless the mask is used the Bromide paper will be fogged. There is included with each Kodak Auto-Focus Enlarger, a set of six flexible metal opaque masks. These are made for use with negatives that are smaller than 4 x 6 inches and include all of the most popular sizes.

The negative holder in this Enlarger is so constructed that an enlargement can be made from a negative that is still in the strip, or before the strip is cut apart, separating the negatives. There is a slot at each end of the negative holder, through which the strip of film can be threaded.

When it is desired to make an enlargement from a negative that is still in the strip, first remove the top sheet of glass from the negative holder and place the metal mask of the correct size on the lower glass, making sure that the mask is placed in position with the beveled ends *up*. This permits the easy threading of the strip of film into the negative holder. Now replace the top sheet of glass but *do not* secure it with the spring fingers at the sides of the holder, as if these should be used there would be too much tension preventing the easy movement of the strip of film. The film should now be threaded into the slot in the holder, with the face or dull side of the negative down, until the end of film projects about an inch through the slot in the opposite end of holder; then fasten the top glass by means of the spring fingers and replace the negative holder in the Enlarger. Draw the strip of film through the negative holder until the negative desired is in position, and then proceed with the making of the enlargement in the same manner as when using negatives that have been separated.

When using glass negatives smaller than 4 x 6 inches it is then necessary to use only the lower sheet of glass in the negative holder. Remove the top sheet of glass, place the metal mask of the proper size on the lower glass, then put the glass negative, face or dull side down, over the opening in the mask, and secure it with the spring fingers on the sides of the negative holder; then replace the holder in the Enlarger with the face or dull side of the negative down or towards the lens.

The Kodak Auto-Focus Enlarger is *always* in focus. The automatic focusing device slides on a vertical cam, which constantly changes the focus with the result that the image is always perfectly sharp, regardless of its size. This eliminates the necessity of focusing.

The Enlarger will make prints from $1\frac{1}{2}$ to $3\frac{1}{2}$ times the dimensions of the negative used, or, in other words, from $2\frac{1}{4}$ to $12\frac{1}{4}$ times its area. The largest print that can be made with the Enlarger is 14 x 21" from a 4 x 6" negative; and the largest print that can be made from a Vest Pocket Kodak size negative ($1\frac{5}{8}$ x $2\frac{1}{2}$ ") is approximately $5\frac{1}{4}$ x $8\frac{1}{4}$ ".

When the Enlarger is being adjusted to obtain the desired size of print, the light should be turned on. This is done by pushing over the switch until it catches. The switch is located on the socket which is attached to the reflector or lamp-house.

The size of the enlargement is determined by the distance the lens is from the paper on top of the table or shelf; the greater this distance the larger the picture. When the light is turned on and the exposure lever turned *down* (this removes the orange colored safelight lens-shield or cap from back of the lens) the image will be clearly visible on the top of the table or shelf. To make the image more distinct place a piece of plain white paper about 11 x 14" in position under the lens of the Enlarger, but make sure that the paper is removed before placing the sensitive Bromide paper in position.

The correct size of the enlargement is obtained by adjusting the camera, sliding it up or down; this makes the image larger or smaller as desired. To adjust the Enlarger for different sizes, first loosen the

wing nut on the back of the standard by turning it to the left, then grasp the frame which contains the negative holder, and move the frame up or down on the standard. When the image as projected on the table is of the desired size, then tighten the wing nut by turning it to the right.

CAUTION: Do not attempt to move the camera up or down by grasping the lens board.

By using the scale on the upright standard, enlargements from $1\frac{1}{2}$ to $3\frac{1}{2}$ times the exact dimensions of the negative can be made. Slide the camera up or down until the movable indicator line is in a position that exactly coincides with the line underneath the figure desired, giving the number of times of enlargement. Enlargements can of course be made with the movable indicator line in a position between the lines as given on the scale. When the scale is used, the image will be the *exact* number of times enlarged, as given by the figures on the scale.



Fig. 3.

Method of adjusting the Kodak Auto-Focus Enlarger to obtain the desired size of enlargement.

The method of adjusting the Enlarger to obtain the desired size of the enlargement is shown in Fig. 3.

After the desired size of enlargement has been obtained, and the wing nut on the standard securely fastened, then turn the exposure lever to the horizontal position. This brings the orange colored lens-shield or cap in position over the back of lens, and gives a safe orange light which is bright enough to allow the proper location of the Bromide paper, and still will not fog the sensitive paper.

To place the Bromide paper in position, first take one of the steel bars (two are included with the Enlarger) and place it on the table near the standard of the Enlarger, and along one side of the projected image. The steel bars are covered on the bottom with felt, to prevent scratching the table. It will be noted that the felt does not extend to the edge on one side of one of the bars. Place that steel bar on the table near the standard of the Enlarger, so that the edge not covered with felt will come next to the Bromide paper. After this first steel bar has been placed in the

proper position then slide the edge of the Bromide paper (coated or emulsion side up) underneath the edge of the bar (that part not covered with felt) and place the other bar (which is covered to both edges with felt) on the opposite edge of the Bromide paper. The coated or emulsion side of the paper must be up; the coated side is slightly concave. If more than one print of the same size is to be made from the same negative, then leave the steel bar nearest to the standard in position, and after the first exposure has been made, lift up the other bar, draw out the paper, then insert the fresh sheet of paper under the edge of the first bar, replace the second bar as before, and all is ready for making the next exposure. By this method all succeeding exposures will be in the same position on the paper as the first print made.

Making the Exposure

To make the exposure, turn on the light, then turn down the exposure lever for the length of time necessary, as shown in Fig. 4. By turning the lever the orange colored lens-shield or cap is removed from the back of the lens. After the proper exposure has been made (refer to rule for making Test Exposures) it should be terminated by turning off the light. This is done by pushing over the switch on the socket fastened to the reflector or lamp-house. This method insures the light being turned off after each exposure.

Important: After each exposure, *turn off the light*. If it is not turned off the heat from the lamp might buckle and ruin the negative. It is, therefore, advisable to turn off the light after each exposure

Use the light only to determine the correct size of the enlargement and to make the exposure.

Test Exposures

It would be a good plan when first attempting the making of enlargements, to make one or more test strips to determine the proper duration of the exposure.

A strip one or two inches wide and long enough to extend diagonally across the important part of the image, will be sufficient.

Correct exposure depends on several factors; the intensity of the light, density of the negative, and size of the enlargement,



Fig. 4.
Method of making an exposure with the Kodak Auto-Focus Enlarger. Turning down the exposure lever.

The first test exposure will be purely arbitrary; if using a 60-watt light and the negative is of average density, and an enlargement of three times the dimensions of the negative is desired, it is suggested that a test strip be made as follows: Cover up two-thirds of the strip with a piece of cardboard and expose for three minutes; move the cardboard and give the middle section two minutes, making five minutes for the first; then remove the cardboard entirely and expose the remainder of the strip one minute. The fully exposed strip will now contain three different exposures—the first section six minutes, the middle section three minutes, and the last section one minute.

While the exact time for the development of a correctly exposed Bromide enlargement cannot be given, the proper exposure may be readily determined by appearance, as the image will appear gradually, developing brilliantly and attaining full strength in about one and one-quarter minutes. Develop this test strip (see pages 142 and 143 for directions). If these test exposures are all very much over- or under-exposed, make another set of test exposures, being guided as to the time of exposures by the first strip. If the image comes up rapidly but dull, and full of detail in the highlights, it has been over-exposed; if weak, and without detail, it is under-timed. Under different conditions the time required for exposures varies from about thirty seconds to about ten or fifteen minutes, according to the light used, density of the negative, size of the enlargement, etc. However, a few trials will narrow the exercise of judgment down to the density of the negative, and the making of correct exposures becomes a simple matter. The best negative for enlarging is one not too dense or too weak, but one that is translucent in the highlights and has good detail in the shadows.

When making enlargements of different sizes it must be remembered that light intensity decreases as the camera is raised or moved further away from the paper, and it will therefore require a longer exposure to make large sized enlargements, than is necessary when making small enlargements.

Do not attempt to count the time; use a watch or clock.

No printing process affords so many opportunities for modifying in the print the characteristics of the original negative as Bromide enlarging.

During the time of exposure, the amateur can shade a little here, give a little longer exposure there, and obtain just the result desired, bringing out detail in the shadows or softening a highlight at will.

In shading any portion during the exposure, hold the shade about midway between the lens and the paper to avoid sharp lines, and to obtain the proper diffusion.

Local Control When making enlargements from negatives of varying quality, very often the enlargement can be improved by controlling the exposure, allowing more or less time on different portions of the print.

Practically all negatives, excepting those that were badly under-exposed, contain much delicate detail that is scarcely noticeable in a small contact print, but is clearly seen in an enlargement.

The absence of detail in small areas of the light or dark tones of a small picture is not displeasing, but in the case of an enlargement, these



Fig. 5.
Showing one method of local control.

areas, being larger, are much more conspicuous and would be improved if more detail could be obtained. If the negative shows detail in these areas we can record this detail in the enlargement, and what is of even greater importance, we can also increase or decrease the contrast between the various tones of the picture as much or as little as we wish, by locally controlling the exposure when making the enlargement. One method of doing this is illustrated in Fig. 5.

The lines leading from the lens to the paper suggest the size of the enlargement being made, and the small dark patch on the projected image represents an area that would appear too dark, or

without detail in the enlargement if the light was allowed to act on it as long as on the other parts of the picture.

The method of locally controlling the exposure is to allow the light to act on the whole picture as long as it is necessary for fully printing the dark tones. Then as soon as the dark tones have been fully printed, hold a piece of cardboard in such a position between the lens and the paper as to prevent the light from reaching and consequently overprinting the part of the picture that has been fully printed, without preventing it from reaching the parts that are not yet fully printed. The size of the cardboard must be determined by the size of the area to be shaded, and by the distance the cardboard is held from the lens—the nearer it is to the lens the larger the shadow it will cast and the more diffused the edges of the shading will be in the finished picture. By holding it about midway between the lens and the paper, and by keeping it constantly moving when the shading is being done, no evident lines due to the shading will show in the picture.

The cardboard should be attached with gummed paper strips, or with any other suitable medium, to a handle consisting of a strip of clean glass about half an inch wide, and fully as long as half the length of the paper used. As the light will pass through this glass the handle will have no appreciable effect on the shading of the picture.

For printing detail in light tones a sheet of cardboard that will shade the entire paper should be used. A small hole must be cut in the cardboard through which the light passes during the shading. The area and shape of the hole can be changed by placing the fingers over part of it.

While somewhat difficult to describe, this is really an exceedingly easy process, and with a little practice, the amateur should be able to obtain the results desired—results that cannot be excelled by any other method known.

If a diffusion or softening of the lines in the picture is desired, this effect can be readily obtained with the Kodak Auto-Focus Enlarger by using a Diffusing Disc. This is made of a specially prepared glass mounted in a round cell, and when it is to be used should be slipped over the lens of the Enlarger.

The Diffusing Disc does not change the focus, nor does it increase the length of exposure, it merely softens the lines of the image. If only a *slight* diffusion is desired, leave the Diffusing Disc in position on the lens for about one-fourth or one-half of the length of time necessary for a correct exposure, then remove the Disc and finish the exposure.

Where the negative is very sharp, especially in the case of landscapes, also negatives made with the Kodak Portrait Attachment of large head and shoulder portraits, the soft effect produced by the Diffusing Disc will be found pleasing and the result very artistic.

Development of Bromide Paper After the exposure has been made the next step is development, which is accomplished in practically the same manner as in the development of a film or plate by the tray or dark-room method.

Provide a ruby or orange lamp, (the Brownie or the Kodak Safelight Lamp, with Series 0 Safelight, referred to on page 136, will be found most convenient), graduate, stirring rod and three trays, preferably of enamel, hard rubber or rubber-lined, and at least an inch larger each way than the sheets of Bromide paper, to facilitate handling.

A rubber-lined tray of any size is easily constructed by gluing a sheet of gossamer rubber cloth into a wooden box or tray.

As the Bromide paper is not as sensitive to light as a film or dry plate, a somewhat stronger light may be employed for developing. The Series 0 Safelight, in the Brownie or the Kodak Safelight Lamp produces a bright orange light suitable for use with Bromide paper, and is perfectly safe and will not fog the sensitive paper. A small window, opening outside, covered with two thicknesses of yellow postoffice paper, will also serve, or the ruby glass may be removed from an ordinary dark-room lamp. The remaining orange glass will be ample protection against fog and allow the process of development to be observed with greater ease.

Use developer at a temperature of about 70° Fahr. The proper temperature is important as if the developer exceeds 70° Fahr. the prints

are liable to fog and the emulsion soften. If too cold, chemical action is retarded, resulting in flat, weak prints. With Nepera Solution prepared in the proportion of one ounce of developer to six ounces of water at 70° temperature, the image should appear in from 12 to 15 seconds. The print should be developed for at least 1 minute to 1½ minutes. If the print develops in less than 1 minute under the above conditions, the exposure has been too long. If the print is not fully developed in 1½ minutes under the above conditions, the exposure has been too short.

After development is complete the print should be rinsed in clean water for a few seconds and then immersed in the fixing bath. Do not attempt to develop too many prints in one portion of developer (see paragraph in the middle of this page).

There are a number of developers that will produce good results on Bromide papers, when handled by experienced persons who understand their uses. The professional photographer enlarges from a uniform quality of negative and for a certain effect. The amateur, on the other hand, finds his negatives varying in density and quality, and the best developer for him to use is the one affording the greatest latitude in exposure and development, and one that keeps well in solution.

Without question Nepera Solution is the best developer for this purpose. Nepera Solution is known as the universal developer, as it may also be used for films, plates and Velox paper.

For use with Bromide paper, use:

Nepera Solution.....	2 ounces
Water.....	12 ounces

This amount is sufficient to develop about twelve 7 x 11 prints or their equivalent, after which a fresh solution should be prepared. When Nepera Solution is not obtainable, the formula given on page 119 should be used in the following proportion:

To Develop

Dilute as follows:

Stock Solution.....	3 ounces
Water.....	12 ounces

This amount is sufficient to develop about eight 7x11 prints or their equivalent.

Fixing Thorough fixing of Bromide papers is of the utmost importance to insure permanency of the prints, and they *must* be fixed in a fresh, acid fixing bath. The preparation of the fixing bath requires the same care and accuracy as is given to the preparation of the developing solution. A fixing bath should be prepared using Kodak Acid Fixing Powder, or use the following formula. If made according to directions it will fix prints quickly and thoroughly in about fifteen minutes, and will prevent blisters which sometimes appear on Bromide prints.

The Kodak Acid Fixing Powder is supplied in packages of different sizes which contain all the chemicals necessary to prepare a correct acid fixing bath. Directions for preparing are given on each package.

Fixing Bath Formula

Water.....	64 ozs.
Hypo (crystal or granulated).....	16 ozs.

When thoroughly dissolved, add 4 ozs. Velox Liquid Hardener or the following hardening solution, dissolving the chemicals separately and in the order named:

Water.....	5 ozs.
Sodium Sulphite (E. K. Co.).....	1 oz.
Acetic Acid (containing 28 per cent, pure acid)....	3 ozs.
Powdered Alum.....	1 oz.

If Sodium Sulphite in crystal form is substituted for powdered, double the quantity mentioned should be used.

When Hypo is first dissolved in water the temperature of the solution is materially reduced. *It is important that the temperature of a fixing bath should never exceed 65 degrees Fahr.* The prints should be moved about for the first three or four seconds after immersion to stop the action of the developer at once over the entire surface of the print. They should remain in the fixing bath for at least fifteen minutes and during this time should be moved one over the other occasionally to insure even fixing and to avoid staining.

After all prints have remained in the fixing bath for a few minutes, the orange shade may be removed from the light and the balance of the operation continued by ordinary light. Before permitting white light to enter, be sure that any unexposed or undeveloped sheets of the Bromide paper have been carefully protected from the light.



Print showing exact size of negative image enlarged on following page.



Enlargement of about $2\frac{1}{2}$ diameters made from same negative as contact print on preceding page

Washing After the prints are thoroughly fixed, they should be thoroughly washed. Allowing them to remain an hour in running water or by giving twelve changes of water, transferring prints separately each time from one tray to another, and allowing about five minutes' rest between each change will accomplish this. Washing should not require a longer time than is necessary to completely free the Hypo from the prints. The temperature of the water in winter should be kept as uniform as possible, as ice cold water may cause blistering. When running water is used for washing, the stream should not be allowed to fall directly on the prints, as it will cause breaks in the fiber of the paper, producing blisters. Place a tumbler or graduate in the washing tray and allow the water to run into it and overflow into the tray. Prints should be moved about frequently, one over another, during the time of washing, when running water is used.

A method of determining when the prints are thoroughly free from Hypo, is given on page 122.

Drying After the prints have been thoroughly washed, they may be dried by suspending them by means of pins from the edge of a table or shelf, or they may be laid out face down on clean cloth or face up on blotters.

Do not use the ordinary commercial blotter as it usually contains a large percentage of Hypo and other injurious chemicals.

Avoid also the use of colored blotters and those containing printed matter, as the coloring and printer's ink are apt to impress themselves on the print.

Mounting

A very satisfactory way for mounting small enlargements, not larger than $6\frac{1}{2} \times 8\frac{1}{2}$, is by the use of Kodak Dry Mounting Tissue, as by using the tissue the print is perfectly flat in absolute contact and does not curl even on thin mounts. Prints larger than $6\frac{1}{2} \times 8\frac{1}{2}$ are best mounted wet with a good starch paste, as a Kodak Dry Mounting Press would be necessary with the tissue in the large sizes. Full instructions for mounting are given on page 123.

Uncurling Unmounted Prints Dry prints that have a tendency to curl may be made flat by the scraping action of a sharp-edged ruler applied to the back, the corner behind the ruler being lifted as the ruler is passed along.

Hints

Mealy Mottled Prints—Indicate over-exposure and short development.

Greenish Tones—Over-exposure, under-development or too much bromide.

Face of Eastman Bromide Paper can always be distinguished by its curling in; the convex side is always the back.

Running Water is not so sure a means for washing prints as changing them from one tray to another, allowing them to remain at least five minutes in each change of fresh water; twelve changes are sufficient; no less.

What Paper to Use

Eastman Bromide Papers, since their introduction over thirty-five years ago, have been considered standard by the photographic public, and testimony as to their superiority is constantly being received.

The list and description of the various kinds of Eastman Bromide Papers and statement of use to which each is best adapted is as follows:

Velvet Bromide Paper—Suited to negatives having broad shadows, the slight sheen of the semi-gloss surface giving to enlargements from such negatives a life and brilliancy which is highly pleasing. Velvet Bromide is especially appreciated by those who enlarge from amateur and from landscape negatives.

Brilliant Velvet Bromide Paper—Similar surface as the Velvet Bromide, but gives more contrast between the high-lights and shadows and should be used when enlarging from weak or flat negatives, or from negatives that lack sufficient contrast to make good prints on Velvet Bromide.

Standard Bromide Paper—Is a natural surface Bromide paper, which is especially adapted to all kinds of enlargements, particularly copies on which crayon or pastel work is to be done.

The emulsion is coated on two different surfaces of paper—B, heavy smooth—C, heavy rough.

B, heavy smooth, is for all sizes of enlargements, also for those which are to be spotted or finished in water colors, India ink or oil.

C, heavy rough, is best adapted for rough work, which is to be finished in crayon or pastel; it can also be finished in India ink, oil or water colors.

BB, double weight, same surface as B, and CC, double weight, same surface as C, need no further description. Their use for unmounted prints and large work is constantly increasing.

Matte-Enamel Bromide Paper—Produces rich carbon blacks and has a smooth velvety Matte surface tinted just enough to lend warmth to the high-lights and half-tones.

Enameled Bromide Paper—A glossy Bromide paper that gives enlargements closely resembling glossy contact prints. When squeegeed to a ferrotype plate a high gloss is produced. It is furnished in medium weight paper only.

Royal Bromide Paper—Sepia-toned enlargements made on Royal Bromide paper have the breadth and softness of fine old etchings.

Negatives having dark, sketchy backgrounds, deep shadows and snappy high-lights will combine to produce an effect with Royal Bromide not obtained with any other Bromide paper.

Royal Bromide is coated on paper having a delicate cream tint, the yellowish cast in high-lights harmonizing beautifully with dark backgrounds, it is not intended for use when vignettted prints with white backgrounds are wanted. Made in smooth surface only.

Special Effects Pictures of beautiful softness and breadth can be made on Royal Bromide by making the enlargement through a screen of silk bolting cloth. The screen softens the heavy mass of the shadows and blends them into harmony with the higher tones.

The most convenient way to use the bolting cloth is to stretch it over a frame. If the screen is used in direct contact with the paper, the enlargement has the effect of being made on fine meshed canvas.

To secure diffusion, place the screen at a distance of one-fourth inch to one inch from the paper. The further the screen is removed the greater the diffusion of light.

The use of the screen increases the exposure about one-third. Focusing (when *not* using the Kodak Auto-Focus Enlarger) should be done before the screen is put in place. With smooth paper the fine mesh bolting cloth should be used. With rough paper use either the medium or coarse mesh. For small prints use fine mesh. For the convenience of our customers we have arranged to furnish the best quality of silk bolting cloth and will ship it in rolls, thus avoiding all folds or creases in the cloth.

Sepia Tones on Eastman Bromide Papers Of the several processes for securing Sepia tones in Bromide prints, we give preference to the method of re-developing and the use of Velox or Royal Re-developer. The results secured with Velox or Royal Re-developer are permanent. There is no change, except in the color of the print, either in detail or gradation.

The expense of the process is slight, as about one hundred and twenty 7 x 11 prints or their equivalent can be re-developed with the contents of one of the larger packages of Velox Re-developer, and the time involved is considerably less than required when using any other method or toning process.

A Bromide print of any texture of surface, which, when made, was *evenly fixed* and *thoroughly washed*, will give a desirable result when re-developed.

Some additional features of Velox or Royal Re-developer are as follows:

Uniformity—Following the directions given with the package will insure absolute uniformity.

Rapidity—A black and white or a Royal Bromide print can be turned Sepia in less than two minutes.

To Prepare Solutions when Using the Velox Re-developer

To prepare bleaching bath dissolve contents of one powder in package marked "Bleaching Agent" in four ounces of water.

To prepare re-developing solution mix one-half ounce of liquid from bottle with 16 ounces of water.

(To prepare the solutions when using the Royal Re-developer follow the instructions as given on the package.)

Directions for Re-development

1. Immerse print in bleaching bath, letting it remain until only faint traces of the half-tones are left and the black of the shadows has disappeared. This will take about one minute though no harm will result from a somewhat longer immersion.

2. Rinse the print *thoroughly* in clean, cold water, until no yellowness remains in wash-water.

3. Place print in re-developing solution until original detail returns. (Fully thirty seconds.) Too strong a solution of Re-developer or too long immersion in this solution will cause blisters.

4. After print has been re-developed, it should be rinsed *thoroughly* then immerse it for five minutes in the following hardening solution:

Water.....	16 ozs.
Velox Liquid Hardener.....	1 oz.

5. Wash for about half an hour in running water; move the prints about occasionally during the time of washing. If running water is not available, give the prints six changes of water transferring prints separately from one tray to another, with an interval of about five minutes between each change.

Coloring Bromide Enlargements

The various surfaces of Bromide are particularly well adapted for coloring, and prints may be made extremely interesting through the many beautiful effects obtained by the use of Velox Transparent Water Color Stamps. No experience is necessary when using these colors and any amateur can secure excellent results, as full directions accompany each set of stamps.

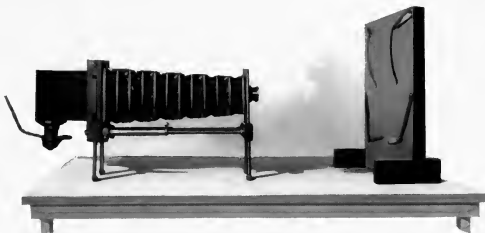
Put up in book form, they will be found most convenient. Each book contains twelve colors, arranged in perforated leaflets, making twenty-four stamps of each color.

There is also made, for the convenience of the amateur, the Velox Transparent Water Color Stamp Outfit which contains everything necessary for coloring prints, etc. The Outfit consists of an Artist's Mixing Palette, three special Camel's Hair Brushes, and one book of Velox Transparent Water Color Stamps (12 colors.)

The stamps will be found most desirable for the coloring of Velox prints, lantern slides, etc., and in fact, for all work where perfect blending and transparency of color is required.

THE KODAK ENLARGING OUTFIT

Of the many kinds of enlarging cameras that have been designed several styles are still in use, but the particular type that permits a wide range of control in the printing of the enlargements, and with which enlargements of any size can be made, is one of the focusing types, in which the negative is held in a sliding frame or carrier, which fits in the back of the camera, while the lens is attached to the camera front. The light that prints the picture passes through the negative, then through the bellows to the lens which projects the negative image to a movable board, known as an easel.



The image is focused on a sheet of white paper which is attached to the easel. After the focus has been adjusted the Bromide paper is placed on the easel and the exposure made.

The enlargement thus obtained may be of any shape or size desired. The shape is determined by the mask that is placed over the negative, and the size of the picture is determined by the distance from lens to negative and lens to easel. These distances can be quickly adjusted by the photographer for securing the size of enlargement that is wanted.

The Kodak Enlarging Outfit is an enlarging equipment of the type we have described. While this outfit is very simple it has all the essential features that are needed for doing the same range of work that the larger and more elaborate professional outfits will do.

The Kodak Enlarging Outfit includes camera, negative carrier, lens, lamp-house and easel. It is furnished complete, ready for use with the sole exception of the 60-watt Mazda lamp that gives the light for printing the enlargement. Local lighting companies supply 60-watt lamps that are adapted for the voltages their lines carry.

With this equipment the photographer can make enlargements from the whole or from any part of a negative, in any dark-room. When a dark-room is not available in the daytime, the enlargements can be made at night in any ordinary living room.

When all doors are closed and all window shades are drawn to fully cover the windows, any room into which no artificial light penetrates, will be dark enough for making enlargements at night. Traces of moonlight that may come into the room through the spaces between window shades and windows will not affect Bromide paper unless the moonlight shines on the paper.

The Kodak Enlarging Outfit will not only make enlargements from $1\frac{5}{8} \times 2\frac{1}{2}$, $2\frac{1}{4} \times 2\frac{1}{4}$, $2\frac{1}{4} \times 3\frac{1}{4}$, $2\frac{1}{2} \times 4\frac{1}{4}$, $2\frac{7}{8} \times 4\frac{7}{8}$, $3\frac{1}{4} \times 4\frac{1}{4}$, $3\frac{1}{2} \times 3\frac{1}{2}$, 4×5 and $3\frac{1}{4} \times 5\frac{1}{2}$ negatives, which are the popular sizes, but from all sizes of both film and glass negatives that are not larger than 4×6 .

Bromide paper should be used when making enlargements with the Kodak Enlarging Outfit.

This outfit may be used as well for lantern slide making. See page 158.

THE BROWNIE AND VEST POCKET KODAK ENLARGING CAMERAS

The Brownie Enlarging Camera idea is to make enlargements in the simplest manner possible and to furnish, at Brownie prices, just the result-producing parts necessary for daylight enlargement.

How well this idea has been carried out may be judged from the low prices at which these cameras are furnished and the fact that with them, enlargements up to 7 x 11 size may be made, and of as good quality as can be obtained by any method.

The Brownie Enlarging Camera is simply a cone-shaped box constructed of substantial material, with a holder for the paper at the large end, and a negative holder at the small end. The box is collapsible for convenience in carrying. It can be set up, ready for use, in a few seconds. The lens (which comes with each Enlarging Camera) is fitted inside the cone at just the right distance to insure a sharp



Fig. 1

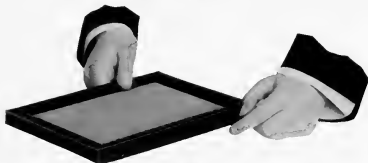


Fig. 2

setting the camera where the full, unobstructed light (not direct sunlight) of the sky will fall upon the negative. When sufficient exposure has been given (explained in the manual supplied with the Enlarger) the paper is developed in the usual manner.

To assemble the camera take everything out of the box and closely inspect Fig. 1, showing appearance of the camera when ready to use. The camera is composed of a cone, in two sections, a lens board and lens, paper and negative holders.

1. Take the paper holder (the large frame with hinged back)

focus always; an out-of-focus enlargement is impossible if the negative is sharp.

In making an enlargement, the box is set up and the negative placed in the holder, a sheet of Bromide paper in the paper holder, and the exposure made by



Fig. 3

and place flat on the table before you, grooved side uppermost, and unclasp buttons on flap, as shown in Fig. 2.



Fig. 4

Wipe out the inside of the camera occasionally with a damp cloth to remove all dust.

On the two long sides of the lens board are metal locks which must be fitted over the pins on the sides of cone. Fig. 4.

4. Before pushing over the locks, fit the wide end of the smaller section of cone into grooves in lens board. Then push the two metal locks over the pins, thus giving firmness and rigidity to the entire cone. Fig. 5. (There are two pins on each side of the smaller section which must fit into the locks in the same manner as the pins on the larger section.)



Fig. 5

5. The small frame containing two sheets of glass (retained by spring fingers), is the negative holder, and is to be fastened to small end of cone by means of the hooks, as shown in Fig. 6.

The camera is now ready, as shown in Fig. 1, and the negative, from which the enlargement is to be made, should be placed in the small frame between the two glasses with the face or dull side towards the lens.

Any size negative, the same size or smaller than the opening of negative holder at end of Enlarging Camera may be used for enlarging. The smaller negative will enlarge in proportion to its size, but will not enlarge to the full capacity of the camera.



Fig. 6

For instance, a $2\frac{1}{2} \times 4\frac{1}{4}$ negative may be used in the No. 3 Brownie Enlarging

Camera, which is primarily intended for use with $3\frac{1}{4} \times 4\frac{1}{4}$ negatives. It will be necessary, however, to use a mask with any negative smaller than the opening in the negative holder, in order to cut out all light other than that which passes directly through the image, as by not using the mask the light around the edges of the negative will fog the print.

The paper holder is to be loaded with a sheet of Bromide (in the dark-room) and all is ready for the exposure, the duration of which is explained in the enlarging camera manual.

The Vest Pocket Kodak and No. 2 Brownie Post Card Enlarging Cameras are similar to the Brownie and differ only as to loading and, due to their reduced size, are not collapsible.

The Vest Pocket Kodak Enlarging Camera makes enlargements post card size ($3\frac{1}{4} \times 5\frac{1}{2}$) from Vest Pocket Kodak negatives.

The No. 2 Brownie Post Card Enlarging Camera makes enlargements post card size ($3\frac{1}{4} \times 5\frac{1}{2}$) from $2\frac{1}{4} \times 3\frac{1}{4}$ negatives.

The No. 2 Brownie Enlarging Camera makes 5 x 7 enlargements from $2\frac{1}{4} \times 3\frac{1}{4}$ negatives, or 5 x 5 enlargements from $2\frac{1}{4} \times 2\frac{1}{4}$ negatives.

The No. 3 Brownie Enlarging Camera makes $6\frac{1}{2} \times 8\frac{1}{2}$ enlargements from $3\frac{1}{4} \times 4\frac{1}{4}$ negatives, or 5 x $8\frac{1}{2}$ enlargements from $2\frac{1}{2} \times 4\frac{1}{4}$ negatives.

The No. 3A Brownie Enlarging Camera makes 7 x 11 enlargements from $3\frac{1}{4} \times 5\frac{1}{2}$ negatives, or $6\frac{1}{4} \times 10\frac{1}{2}$ enlargements from $2\frac{7}{8} \times 4\frac{7}{8}$ negatives.

The No. 4 Brownie Enlarging Camera makes 8 x 10 enlargements from 4 x 5 negatives.

Proportionate enlargements can be made from smaller negatives with the No. 2, No. 3, No. 3A and No. 4 Brownie Enlarging Cameras.

The ease of setting up the Brownie Enlarging Cameras is shown in the accompanying illustrations.

Lantern Slides

THE making of lantern slides is one of the most fascinating and at the same time one of the simplest branches of amateur photography.

A well selected and prepared set of lantern slides will provide a most pleasant evening's entertainment, and as the apparatus necessary for projection does not entail a great outlay, the amateur pursuing this branch will find his efforts well rewarded.

The first essential for a good lantern slide is a good negative, one not only of even gradation, but free from physical blemishes such as pin holes or scratches. It must be remembered that the picture thrown on the screen is magnified many times and imperfections almost too small to be noticed in the negative or slide will show up most alarmingly on the screen.

On the other hand, it is quite possible to produce a good slide from an indifferent negative by alterations in exposure and development:

For instance, a flat negative may be made to yield greater contrast in the slide by a slight under-exposure and a little longer development, or if the negative has more than the proper contrast a little longer exposure will tone this down, and thus even up the gradation in the slide.

In selecting negatives to be used in making slides, examine them carefully, spotting out with extreme care, pin holes, scratches and the like. In spotting be careful to match the surrounding density as nearly as possible; if your spotting is too strong, it will result in corresponding transparent spots on your slide which will be exceedingly difficult to doctor.

Making the Slide

There are two methods of making lantern slides, by contact and by reduction. The contact method being the simpler of the two will, no doubt, appeal to the beginner.

The contact method entails no apparatus beyond an ordinary printing frame. With this method the negative is placed face up in the printing frame, and the lantern-slide plate is placed in contact with it, the exposure being made in the same manner as when making a Velox print. It stands to reason, that by the contact method, if the negative is larger than the slide plate, only such portions can be used as will come within the limits of the slide plate (the standard American size being $3\frac{1}{4} \times 4$ inches.)

In a great many instances the actual picture is confined to a small portion of the negative, and the area of the slide plate will be found sufficient to encompass it. When such is not the case the reduction process must be resorted to.

In making slides by contact it will be well, though not absolutely necessary, to select a printing frame several sizes larger than the negative employed.

Note—If you are working with film negatives, the printing frame should be provided with a sheet of clean, clear glass as a support.

As lantern slide plates are as sensitive to white light as a sheet of bromide paper, the operations of exposure and development must be carried on in the dark-room, making use of the regular dark-room lamp; the actual exposure, of course, being made by white light.

After placing the negative in the printing frame, face up, place the lantern slide plate film side down, in contact with the negative, covering with a black paper mask such portion of the negative as you do not desire to have included in the slide. Remember, that as all slides are used in the lantern horizontally, no slides can be made vertically on the slide plate.

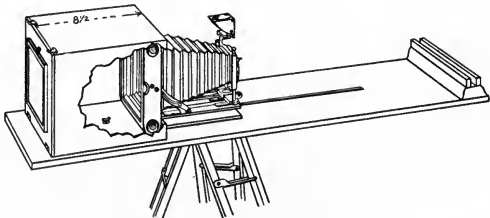
Having adjusted the slide plate on the negative to your satisfaction, place the back of the printing frame in position, and before making the exposure see that the cover is on the box of unexposed slides. The exposures should be made by artificial light, such as the ordinary oil lamp, or gas or electric light. To secure even illumination the printing frame should be about twelve inches from the light.

The time of exposure will, of course, vary according to the density of the negative and the intensity of the light, and as the various brands of lantern slide plates differ in rapidity, a test exposure will be necessary.

As a basis for a test using a Welsbach gas burner, select a negative of average density, cover one-half, and make an exposure of six seconds, then uncover and make another exposure of six seconds; you will then have one-half of the plate with twelve seconds exposure, and the remaining half with six.

Develop, fix and wash the same as for a dry plate (using the formula recommended by the maker of the plate you are using) and determine the correct exposure from this test.

Slides by Reduction When making slides by reduction, the whole or any part of the negative may be reproduced in the slide, as the negative image is projected upon the surface of the plate, in a manner similar to that employed in the making of enlargements.



Utilizing the Kodak for slide making.

The above illustration clearly shows how any one of the present models of focusing Kodaks may be utilized for slide making by reduction.

As the bellows extension of the Kodak is insufficient for producing full size slides, except from very large negatives, the necessary focal length is obtained by means of an extension at the back. This extension is simply a rectangular wooden box, with an opening in the front just wide enough to admit the extended bellows and base-board of the Kodak when pushed through from the inside of the box (the back of the Kodak, of course, being removed), the body of the camera being held in position against the front of the box by means of two small metal hooks. The length of the extension is determined by the bellows length of the Kodak. The Kodak used in the illustration is the 3A, the extension being $8\frac{1}{2}$ inches. This is sufficient for producing full size slides $3\frac{1}{4} \times 4$ inches and from $3\frac{1}{4} \times 5\frac{1}{2}$ negatives, or larger. The back of the box is hinged at the bottom, allowing it to drop down to admit the Kodak, fastening at the top by means of a spring catch.

An opening is cut in the back of the box $3\frac{3}{8} \times 4\frac{1}{8}$ inches and rabbets fitted to receive a sheet of ground glass in a frame, or a $3\frac{1}{4} \times 4$ plate holder. The frame holding the sheet of ground glass for focusing should be the same thickness as the plate holder and care exercised that the ground glass and lantern plate are in exact register.*

The back of the extension should rest against small cleats inside the extension, so as to make it light-tight, and the interior painted a dull black to avoid reflections.

The illustration shows the Kodak and extension fitted to a board $3\frac{1}{2}$ feet long and 6 inches wide.

The board is slotted, to receive a tripod screw fitting into a socket in the bottom of the extension, so that the Kodak may be firmly locked at any point. The front end of the board is rabbeted to receive an ordinary printing frame, without the back, for holding the negative. The negative is placed in the frame, with the emulsion side facing the Kodak, and held in place by means of turn hooks or thumb tacks.

A good, strong tripod forms a splendid support for the outfit, or it may be placed on an ordinary table.

For exposure, a north light is preferable, and one unobstructed by trees or buildings. If this is not possible, place a sheet of finely ground glass back of the negative to diffuse the light evenly. All windows should be blocked, except a space a little larger than the negatives used, and the negative is placed as close to this opening as possible. The image is focused on the ground glass panel at the back of the extension in the ordinary manner, after which the plate holder is inserted and the exposure made by means of the shutter.

As the speed of lantern slide plates is practically the same as that of Bromide paper, see page 139 for suggestions as to exposure.

*A 4×5 or $3\frac{1}{4} \times 5\frac{1}{2}$ plate holder may be used if fitted with a $3\frac{1}{4} \times 4$ kit.

Making Lantern Slides with the Kodak Enlarging Outfit

With the Lantern Slide Block and the Kodak Portrait Attachment No. 5, the Kodak Enlarging Outfit can be easily utilized for making lantern slides. Remove the wing nut from the bolt and place the Lantern Slide Block in position in the center of the easel (it will be necessary to make a hole about three inches long in the center of the cardboard on the easel to admit the bolt on the Lantern Slide Block), then replace the wing nut on the bolt and tighten the block by turning the wing nut to the right. The slot in the center of the easel makes a vertical adjustment of the Lantern Slide Block possible in order to properly center the image. The easel, with Lantern Slide Block in proper position is shown in the illustration. Place the Kodak Portrait Attachment over



lens and bring the camera quite close to the easel, then focus the camera as when making enlargements. The Kodak Portrait Attachment reduces the size of the image, and in this manner it is possible to make lantern slides from large negatives, or particular parts of them, reducing the image down to the proper size.

Full instructions for developing are included in each package of lantern slide plates.

Coloring Lantern Slides

IT is just as easy to color lantern slides as it is to tint prints, and when we see the colors of nature in the large picture that is projected from the small lantern slide to the viewing screen we can almost believe we are looking through the window of a darkened room at the actual objects that the picture represents.

Ordinarily, lantern slides need no preparation for coloring other than thoroughly hardening the gelatine in which the image is embedded, so that it will not be injured when the colors are applied. This is accomplished by immersing the slides for one minute in a solution of one part 40 per cent. formaldehyde and twenty parts water, after which they must be thoroughly washed and dried.

The materials needed for coloring are, a book of Velox Water Color Stamps, some number 3 or number 4 red sable water-color brushes, an enameled or porcelain slant with depressions for colors, and a tumbler of water. The lantern slide should be supported in an inclined position on a piece of opal or ground glass, with an incandescent light behind it. All the light except that coming through the slide should be masked off.



R. O. C. Retouching Desk

This can be done with black paper.

The R. O. C. Retouching Desk, which can be obtained through Kodak dealers, is an especially convenient device for holding the slides.

Lantern slides should not be colored by daylight, for shades of color that look different by daylight may look too much alike by the artificial light used in a projecting lantern. The colors most useful are deep yellow, flesh tint, brilliant red, warm brown, deep green and light blue. Sepia and light brown can be prepared by mixing Velox colors in suitable proportions. Equal proportions of brown, flesh tint and deep yellow make a good light brown, and brown with a little dark blue and scarlet make a sepia. A wash of sepia followed, when dry, with a second coat of light blue gives a very satisfactory effect which is especially useful for distant mountains.

A wash of yellow followed by red will give orange, and the shade may be altered at will. So with all other combinations. The colors best mixed beforehand are, roof red for tile roofs, etc., made up of flesh tint, warm brown and stone gray; and a good greenish gray for rocks, old buildings, etc., obtained by mixing warm brown with a little

dark blue. Do not use much purple, violet, dark blue or other color that does not contain yellow, for these colors are dull and lifeless when projected by artificial light.

Special color combinations may be made by blending them on the slide itself. If it is desired to mix them before applying to the slide, this should be done on a sheet of glass. Do not mix the colors on the slant, for it is best to keep the original colors pure and clean so that the unmixed colors that are not used can be dried and used again.

Having prepared the colors according to the instructions that are furnished with the Velox Water Color Stamps, place the slide in position for coloring, with the picture upside down, and wash in the sky, if sky there be, by filling the brush with light blue, not too strong, and washing back and forth across the slide, beginning at the bottom of the slide (the top of the picture) and gradually running the color up toward the horizon. Do not let the color rest on the slide, but keep it moving. It is much easier to deepen a shade than to take out one after it is set. Some workers prefer to apply plain water, with the brush, to the part of the film that is to be tinted, until the film is well wetted, as this prevents the film from absorbing the color too rapidly, but a little experience will make this unnecessary. Spread the color evenly, leaving the sky colorless next to the horizon. You never see a sky in nature that is blue all the way down. Do not color the sky pink at the horizon and blue above. It is not natural. For sunset effects, flesh color at the horizon, shading into deep yellow above, is most pleasing. Use the color more dilute as you approach the horizon so that the last strokes are practically clear water.

Remove all excess water with a comparatively dry brush, and set the slide to dry. Start another in the meantime. It is well to work on six or eight slides at once, keeping them in rotation, and putting in one color at a time and letting the slide dry between colors, so the colors will not run together. When it is desired to blend two or more colors, the second should be put on before the first one dries.

If clouds are present in a picture, they may be left white, running blue around them. In fact, it is possible to create white cloud effects by leaving irregular patches of clear film when coloring the sky, even if no clouds are indicated in the original picture. To do this effectively requires some skill, however, Dark clouds are best left uncolored.

If an evening effect is desired, do not use blue color, but tint the spaces between the dark clouds with yellow and run a light flesh tint around the edges of the clouds, shading into the yellow. Until skill is acquired in laying in colors, it is best to use only clear blue at the zenith, shading to colorless at the horizon.

Having finished the sky, turn the slide so that the picture will be right side up and put in the greens for trees and foliage. A medium wash of green, afterwards touched up with yellow in the highlights and blue in the shadows, gives an effect of depth which is very desirable. Most of the greens in nature contain much yellow, especially in spring.

Warm brown for roads, walls or warm toned rocks, stone color for others and your slide is nearly done. Water looks blue when it reflects a blue sky. The sea should usually be tinted blue and streaked while wet with brown or sepia and green, blending the light washes so as to give a pleasantly varied effect.

Faces and hands should be tinted the color of flesh, a second coat being applied to cheeks to deepen the tint, if the face is large enough.

The clothing should be tinted to show its natural colors. It is always best to guard against using too much color. One's aim should be merely to tint the slide so as to give a natural effect and not enough to attract attention to the coloring.

COLORING PHOTOGRAPHS

PHOTOGRAPHS can often be made more attractive by the addition of color. Picture post-cards, calendars, Christmas and birthday greetings may be made more attractive by tinting. Studies of plant, animal or insect life are much more useful if carefully colored from life or accurate notes.

The most suitable prints for coloring are those with a semi-gloss surface like Velvet Velox or Velvet Bromide. Prints with a very high gloss are not so easily colored. Much of the success in coloring prints depends upon the nature of the print to be colored. It must not be too dark, as the heavy tones showing through the color will deaden the clearness and brilliancy of any transparent tint that is used. When the shadows are black this will show through any color and destroy its effect. The most desirable print is one that reproduces all the detail in the negative, but with dark gray instead of black shadows. Such a print can always be made, providing the negative is not too contrasty, by exposing it to the printing light just long enough to get detail in the highlights and developing it for about half the time it should have if it was not to be tinted.

A necessary precaution is to keep the face of the print free from any trace of greasiness, finger marks, etc., otherwise water color tints will not "take" evenly on the print. If the sensitive surface of the print has been hardened considerably by too long an immersion in an acid fixing bath it will not take the color well. It should be softened by bathing in a weak solution of ammonia—common household ammonia one part to twenty parts of water—for three or four minutes, then washed thoroughly in several changes of water.

Mixing colors will be simplified if it is borne in mind that the tints required are varying combinations of the three primary colors—red, yellow and blue. With these three colors, of as true shades as possible, the secondary colors are secured by mixing; for orange take yellow and red; green, yellow and blue; violet, red and blue. When the yellow predominates in green, or red predominates in either violet or orange, a warmer tone is produced, while the reverse effect is produced by increasing the proportion of blue.

Two colors are complementary to one another when one is a mixture of two of the primary colors and the other is the third primary missing from the combination, such as yellow and violet; blue and orange; red and green. As each pair contains the three primary colors they balance one another, and when seen side by side, each complementary increases the apparent intensity of the other by contrast. Another point is that the brilliancy, or purity of shade, of a mixed tint can be reduced or made grayer by the addition of its complementary color.

While moist water-colors in pans or tubes are suitable, the most convenient colors for amateur use are the dry colors put up in booklet form. The booklet of Velox Transparent Water Color Stamps contains twelve leaflets, scored so that twenty two stamps or small sheets, uniform in size, can be cut from each leaflet. The stamps are dissolved in water and are then ready to use. They are probably the most convenient and economical colors to use for occasional work.

In addition to the colors the requirements are slight: a few camel's-hair brushes of different sizes, a supply of absorbent cotton, blotting paper, several small saucers or an artist's china-slant in which to mix the tints, and a sheet of glass slightly larger each way than the size of the print to be colored.

When ready to color, soak the unmounted print in water until thoroughly limp, place one or two layers of damp blotting paper on the glass and on this lay the wet print, rubbing it down flat with a clean blotter, which will also take up the surplus water from the print. The color washes can now be floated on evenly and any streaky appearance avoided.

When large spaces, such as the sky in an open landscape, are to be done, a weak tint should be floated on freely by means of a tuft of absorbent cotton saturated with the color. Give the print time to absorb the tint, then gently remove any surplus color by going gently over the surface with a wad of cotton that has been dipped in clear water and wrung out. If this is done after every wash it will prevent the formation of "tear drops", caused by the floating color settling in spots as it dries. If the first application of color-wash does not dry deep enough the process should be repeated until the depth desired is obtained. If the print should become too dry while working it should be moistened on the back with water, the blotting paper dampened and pressed down flat again.

The larger portions of a subject should always be treated first and when the general color scheme looks right the smaller details can be filled in—these are best done after the print has dried out somewhat.

If moist colors are used great care must be taken to avoid getting any tint where it is not wanted, because the washes sink into the print and are difficult to remove. If a color should accidentally run over the limit, the tint if not too strong, can usually be sufficiently reduced by repeatedly washing the spot with ammonia water, dried off with cotton moistened with clear water.

When it is desired to convey an impression of depth and space, more especially in open outdoor scenes, delicate tints should be used for the

sky and distance, cool gray and violet tones for the extreme distance, saving the darkest and more powerful colors for the foreground. In a bright sunny scene as much warm color should be worked in as the nature of the subject will stand, keeping the shadows cool in tone by the use of violet and blue-green washes—strengthening the effect through the power of color contrast.

The work is easier than it sounds in the description, and the results improve rapidly with practice.

Photographic Silhouettes

Reprinted from "Kodakery"

A "SILHOUETTE" usually consists of a uniformly dark image on a white ground. There are, of course, white silhouettes also, though dark ones are usually understood.

As the image in a portrait silhouette is void of detail the attention of the observer is forcibly drawn to its outlines, which are usually characteristic enough to disclose the identity of the person portrayed.

Long before the invention of photography, silhouettes were made by tracing the outlines of a shadow on the wall, or on a sheet of paper, and then filling in these outlines with dark



Trimmed Image taken from Full Image on Page 165.



Selected Parts Printed from Negative. Full Image on Negative Shown on Left.

pigment. Silhouettes were also made by cutting the shadow portraits from black paper with a pair of scissors. This latter method became very popular in the early part of the last century and many of the excellent sil-



A SILHOUETTE INCIDENT

Full Size of Image. How it may be trimmed is
Suggested by Illustration on Page 164.

houettes that were made at that time, especially those of our presidents and other public men, are now preserved in museums. It is interesting, incidentally, to recall that the first sun prints ever made were silhouettes.

Photographic silhouettes can be made by any kind of light that is strong enough for making a negative, but the surest and easiest way of obtaining uniform results is to make the exposures by flash-light in the evening.

Two rooms, with a doorway between, are needed. The doorway must be wholly covered with a sheet of white cloth (a bed sheet is excellent) stretched smooth so that no wrinkles can be seen. Wrinkles in the sheet will show in the print. The subject and the camera are placed in one room and the flash-light in the other. The subject is posed before the sheet, facing at a right angle to the camera. The face should be in full profile, so that not even the lashes of the eye nearest the sheet will be visible when the subject is viewed from the position of the lens.

As shown by the diagram on page 167 the flash-light should be so placed that a line drawn from the center of the lens to the position of the flash-light would pass through the center of the sheet that covers the doorway.



Full Image with all Accessories.



Trimmed Image Accentuating Figure.

Just before making the exposure all lights in both rooms must be extinguished and after the shutter is opened the flash-light is ignited, after which the shutter should be immediately closed and the lights in the room turned on again.

In making silhouettes reflections from the walls, pictures and furniture should be avoided. A doorway near the corner of a room is not suitable, unless the wall paper is very dark. White or light colored costumes are also less suitable than those that are dark.

The negatives must be contrasty, so that nothing but the shadow-like image of the subject will show in the print. Contrasty negatives



Image Shown on Page 166 as
Printed Through a Mask.

show in the negative outside the area covered by the sheet. The outlines of costumes and accessories may also be modified by this method, if desired.

Silhouettes must be printed on contrasty paper, like Regular Velox. Soft paper, like Special Velox, is not suitable unless the density of the background is extreme.

When the subject is placed 2 feet from the white sheet and the flash-light is ignited 5 feet behind the sheet, with the lens stopped to *f*.8 (U. S. 4) the following table will indicate size of flash sheet to use with the various sizes of cameras listed:

$1\frac{5}{8} \times 2\frac{1}{2}$	} 1 No. 1 Eastman Flash Sheet
$2\frac{1}{4} \times 3\frac{1}{4}$	
$2\frac{1}{2} \times 4\frac{1}{4}$	} 1 No. 2 Eastman Flash Sheet
$3\frac{1}{4} \times 4\frac{1}{4}$	
$3\frac{1}{4} \times 5\frac{1}{2}$	} 1 No. 3 Eastman Flash Sheet
4×5	
$4\frac{1}{4} \times 6\frac{1}{2}$	
5×7	

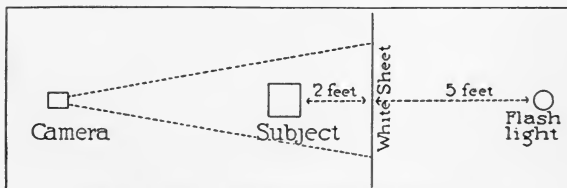


Diagram showing arrangements for making Silhouettes.

will be obtained by developing the films in the Kodak Film Tank for fifteen minutes, with two Tank Developing Powders, used at a temperature of 65 degrees. Tray developed negatives will be contrasty if developed with a double strength developer, until the background (as seen from the back of the negative) is blackened to the base of the emulsion.

The lower part of a silhouette negative should usually be masked in printing. The mask may be made of any kind of opaque paper, cut or torn to the shape desired. The mask may be laid between the printing paper and the negative, or held over the back of the negative during printing.

Opaque may be applied with a spotting brush (both of which may be had of Kodak dealers) on the back of the negative, for blocking out the image of anything that may

GLOSSARY OF PHOTOGRAPHIC TERMS

- ACID**—A sour substance in crystal or liquid form, being a compound of hydrogen, in which all or part of the hydrogen may be exchanged for a metal, forming a new compound. Acids have the power to decompose most carbonates.
- ABERRATION**—A defect in a lens causing it to give a distorted image or one not perfectly sharp.
- ABRASION MARKS**—Black lines or markings produced on the surface of photographic paper by rubbing or pressure.
- ACTINIC**—The “actinic rays” of light are those which produce chemical changes or photographic action.
- ACTINOMETER**—An instrument for gauging the strength or actinic power of light by an observation of the time taken for a sensitive paper to darken to a standard tint.
- ACCELERATOR**—A chemical added to a developer to bring out the image more quickly—sodium carbonate is commonly employed.
- AIR BELLS**—Bubbles on sensitized surface of prints, produced by immersing the paper face down in the developer or using too small an amount of solution.
- ACHROMATIC**—Colorless; applied to a lens whose chemical and visual focus coincide. (See page 6.)
- ALKALI**—The direct opposite of an acid, and with power to neutralize acids and form fresh compounds called salts.
- ANASTIGMAT LENS**—One free from astigmatism, or the fault of not bringing vertical and horizontal lines equally well to a focus.
- ANHYDROUS**—A chemical term signifying that a substance is absolutely free from water.
- ASTIGMATISM**—A defect in a lens that prevents it from rendering vertical and horizontal lines equally sharp.—See Anastigmat.
- BACKING**—A coating of non-reflecting material applied to the back of a plate, to prevent halation. (Note.—Use Kodak Film and avoid halation.)
- BATH**—A term applied to a developing, fixing or other solution.
- BUBBLES**—See air bells.
- CABLE RELEASE**—A short, flexible, cloth encased wire with a push-pin head, operating the release lever of a shutter.
- CONCENTRATED**—As applied to liquid preparations means that the chemicals which comprise them have been dissolved in the least possible quantity of water.

- CONTRASTY**—A term applied to prints meaning hard, "chalky." extremely black shadows and white highlights; lacking in detail as applied to negatives.
- CONVERTIBLE LENS**—One in which the two component glasses (front and rear elements) can be used as separate lenses.
- COVERING POWER**—The limits within which a lens is capable of giving a well defined image.
- CURVATURE OF FIELD**—A defect in a lens showing sharper definition at the center of the plate than at the edges.
- DEFINITION**—Clearness and sharpness of image.
- DENSE**—Applied to negatives which have been over-developed.
- DENSITY**—The printing capacity of a negative.
- DESICCATED**—Anhydrous. Dry powder, not crystals. Applied to chemical salts from which all water has been removed.
- DEVELOPING-OUT PAPER OR D. O. P.**—Sensitized paper upon which the photographic image is invisible until development has taken place. Applied to "gas-light" papers or those printed by artificial light. Generally applied to papers which require longer exposure than Bromide papers.
- DEPTH OF FOCUS**—The power of a lens to render sharply both near and distant objects at the same time
- DETAIL**—The definition recorded by the lens of the minute parts of a subject.
- DEVELOPER**—A chemical solution employed to bring out or render visible the latent image.
- DEVELOPMENT**—The process of converting the latent or invisible image on a film, plate or paper into a visible image.
- DIFFUSED LIGHT**—Such as comes from a clouded sky, in contra-distinction to direct sunlight. Light which does not strike directly, but is arrested and diffused by some medium, such as ground glass.
- DIFFUSION OF FOCUS**—Throwing the image a little out of focus to produce a soft effect.
- DISTORTION**—An incorrect rendering of the image.
- DODGE**—To dodge is to prevent light from striking a portion of a negative when printing by shading that portion with some opaque body.
- DOUBLET**—A lens composed of two separable lenses.
- EMULSION**—A term applied to the sensitized coating on plates, films or paper, which is acted upon by the light rays.
- EQUIVALENT FOCUS**—The distance from the optical center of a lens to the ground glass when focused on a distant object.
- EXPOSURE**—The period of time during which a sensitized film, plate or paper is exposed to the action of light.

- FERROTYPE PLATE**—A highly polished enameled plate of thin metal frequently used for obtaining a high gloss on prints, by drying the print with its face in contact with the plate.
- FIXING**—The process of removing the unacted upon silver salts from a negative or print, usually by immersion in a solution of hypo.
- FLARE SPOT**—A circular patch of light in the center of the image caused by a defect in the lens.
- FLAT**—Lack of vigor or contrast in a negative or print.
- FLATNESS OF FIELD**—That quality in a lens affording sharp impressions at both center and edge of plate.
- FOCUS**—The point at which converging rays of light from a lens meet, forming an image. A picture is said to be in focus when all details are sharp and well defined.
- FOCUSING SCALE**—A graduated scale for different distances, fixed to the bed of a camera, and which permits of focusing for any given distance, without using a ground glass screen.
- FOCUSING SCREEN**—A sheet of ground glass at the back of the camera on which the image is focused and arranged before exposure.
- FOG**—A deposit of metallic silver all over the plate or film, including those parts which should not have been affected by light.
- FORCING**—Attempting to bring out detail in an under-exposed film, plate or print, usually by the addition of accelerator—liable to produce fog.
- FREAKS**—Peculiar white markings caused by incorrect developing solutions. (See page 128.)
- FRILLING**—The puckering up and detachment of the film around the edges; happens oftenest in hot weather, or through too much alkali in the developer. (Easiest avoided by employing tank development.)
- HALATION**—A blurred effect, resembling a halo, usually occurring around a window opening, or other exceedingly strongly illuminated portions of the image; caused by a reflection of the rays of light from the back of the plate. (Kodak Film is non-halation.)
- HALF-TONES**—All gradations between highlights and deepest shadows.
- HARDNESS**—Excessive contrast in negatives or prints, too great difference between lights and shadows.—See Contrast.
- HIGHLIGHTS**—The portions of a picture upon which the greatest amount of light is concentrated. The denser portions of a negative or the lightest parts of a print.
- HYDROMETER**—An instrument for testing the specific gravity, and hence the strength, of solutions used in compounding developing solutions.
- HYPO**—The abbreviation of the term Sodium Hyposulphite, or more correctly, Sodium Thiosulphate, used for fixing films, plates and paper; may be obtained for use in either granulated or crystal form.

- IMAGE**—The picture thrown by the lens upon the focusing screen, or sensitive film.
- INFINITY**—A lens is said to be set for infinity when focused at a point beyond which all objects are sharply defined.
- INTENSIFICATION**—Increasing the density of a negative or print.
- LATENT IMAGE**—The image impressed upon a film or plate by light action, and which is invisible till chemically treated by the process known as development.
- LATITUDE OF EXPOSURE**—That quality in a film or plate which allows variations in exposure without detriment to the quality of the negative. (Kodak Film has this quality in the highest degree.)
- LENS**—A circular glass or combination of glasses optically ground and polished, mounted in a metal cell.
- LIGHT FILTER**—Any colored glass, stained film, or solution used with the lens, which absorbs rays of certain colors and allows others to pass.
- LIGHT FOG**—A graying of the image, produced by an unsafe dark-room lamp, or accidental exposure to white light, through a defect in apparatus.
- MILKY**—Appearance of some incorrect fixing baths. Often the result of using impure chemicals.
- NEGATIVE**—A photographic image on a plate or film in which the dark portions of the subject appear light, and the light portions dark.
- NON-ACTINIC**—Those colors or rays of light which do not affect sensitive emulsions.
- ORTHOCHROMATIC**—Color sensitive. A film or plate is said to be orthochromatic when it is sensitive to colors of the spectrum other than the blue and ultra-violet. (Kodak film is highly orthochromatic.)
- OXIDATION**—As applied to developer—a deterioration due to the presence of oxygen. An oxidized developer is dark in color and usually causes discoloration of the negative or print.
- OVER-EXPOSURE**—Too long exposure of the sensitive surface.
- OVER-DEVELOPMENT**—Too long a time in the developing solution.
- PIN HOLES**—Minute spots or holes in a negative, usually caused by dust settling on the surface before exposure.
- POSITIVE**—A term used in contradistinction to negative.
- PRINTING FRAME**—A specially constructed frame for making prints. Holds the negative and sensitive paper in contact while printing.
- PRECIPITATE**—A substance which, having been dissolved, is again separated from its solvent and settles to the bottom of the vessel containing it.
- RACK AND PINION**—A screw and rack adjustment for easy and accurate focusing.
- RECTILINEAR LENS**—One which does not distort or show curvature of straight lines in the image.

- REDUCER**—A chemical solution for decreasing contrast or density.
- REFRACTION**—The change in direction of rays of light when passing through a transparent medium.
- RESTRAINER**—A compound or solution that will check or hold back the action of the developer. Potassium Bromide in weak solution is commonly employed.
- RETOUCHING**—The removal or softening of defects in a negative, by the application of pencil or color.
- RETOUCHING MEDIUM**—A solution of gum and turpentine, applied to the negative, to afford a "tooth" for the lead or color applied.
- REVERSAL**—The image or portions of it being positive instead of negative or vice versa. Caused by extreme over-exposure or exposure to white light during development.
- SHADOWS**—The thinner portions of a negative or the darker portions of a print.
- SOFT**—Term applied to print or negative; refers to lack of brilliancy or contrast. A "soft" print will contain all possible detail.
- SPECTRUM**—Solar—The seven colors produced by passing a ray of white light through a prism.
- SPHERICAL ABERRATION**—A lens defect—the inability to bring the marginal and central rays of light to one focus, resulting in a loss of sharpness.
- SPOTTING**—The filling-in of spots or imperfections in a negative or print by means of india ink or color with a fine brush.
- SQUEEGEE**—Usually a strip of soft rubber set in a handle, or a rubber roller, and used to place a print in absolute contact with the ferrotype plate.
- SQUEEGEEING**—Pressing wet prints face down on ferrotype plates to obtain high polish.
- SYMMETRICAL LENS**—One whose combinations are of similar curves, and whose combinations may be used singly.
- TEN PER CENT. SOLUTION**—Approximately, a solution made by dissolving one ounce (by weight) of dry chemical in nine fluid ounces of water.
- TONE**—The shade, hue or degree of color prevailing in a negative or print. Also depth or intensity of any part of a photograph.
- THICK**—(See Dense).
- UNDER-EXPOSURE**—Too short an exposure for correct results.
- WEAK**—Thin, soft, lifeless, lacking contrast.

